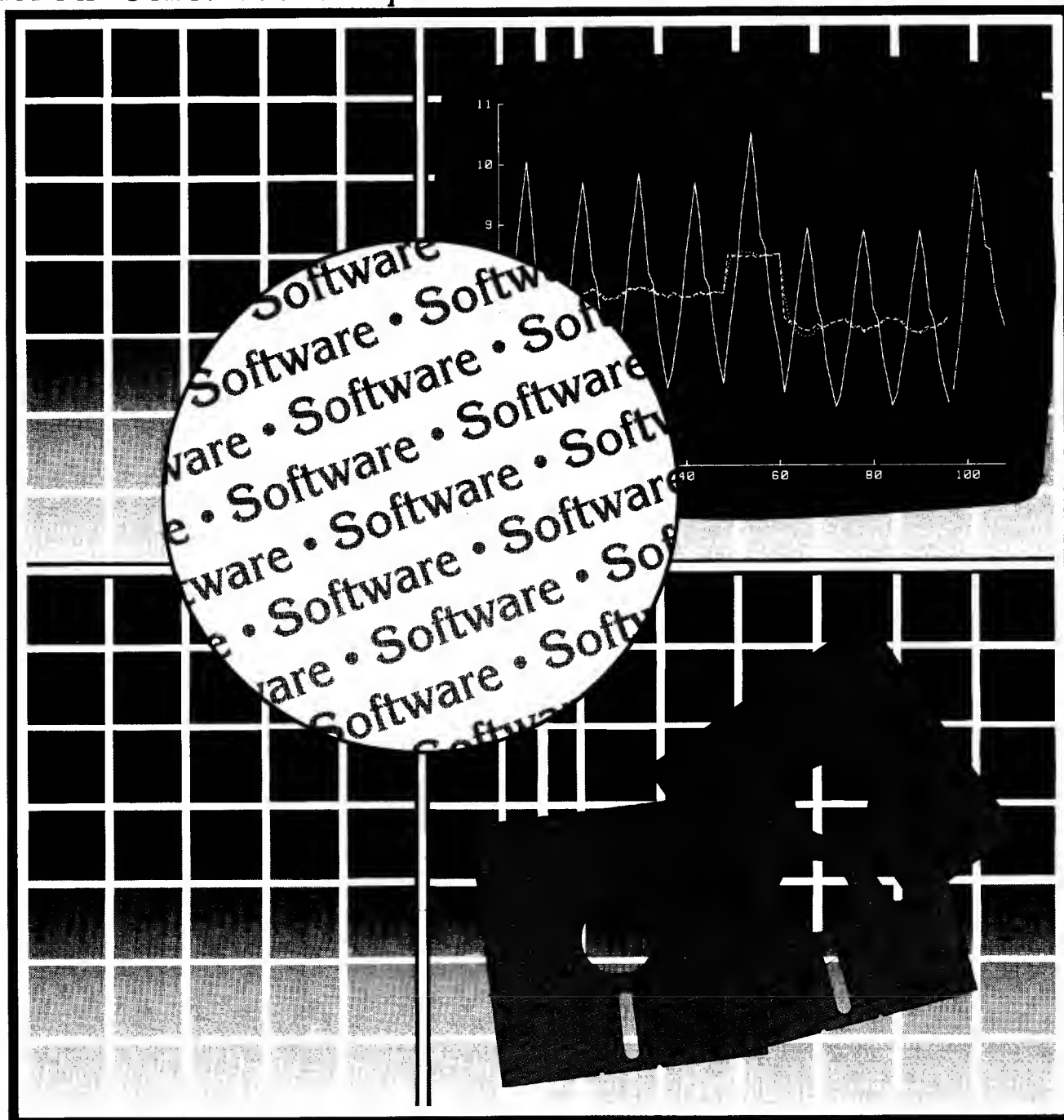


System Tests

for HP Series 200 Computers





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System Tests

for HP Series 200 Computers

Manual Part No. 09800-10031

| | | |
|---------------|-------------|-----|
| Disc Part No. | 09800-10334 | 3½" |
| Disc Part No. | 09800-10335 | 3½" |
| Disc Part No. | 09800-10534 | 5¼" |
| Disc Part No. | 09800-10535 | 5¼" |

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Printing History

New editions of this manual will incorporate all material updated since the previous edition. Update packages may be issued between editions and contain replacement and additional pages to be merged into the manual by the user. Each updated page will be indicated by a revision date at the bottom of the page. A vertical bar in the margin indicates the changes on each page. Note that pages which are rearranged due to changes on a previous page are not considered revised.

The manual printing date and part number indicate its current edition. The printing date changes when a new edition is printed. (Minor corrections and updates which are incorporated at reprint do not cause the date to change.) The manual part number changes when extensive technical changes are incorporated.

May 1983...First Edition

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Chapter 1

Introduction

System Tests Overview

The Series 200 System Tests software detects and reports hardware failures in all Series 200 computer mainframes, most interface cards and most supported peripherals. Additional utilities are provided that list the types of interface cards resident in your computer, and describe how to clean Model 26 (9826) and 36 (9836) internal disc drive heads.

The System Tests do **not** include tests for CS/80 (Command Set 80) disc drives, such as the HP 7908, 7911 and 7912. To test CS/80 devices, use the CS/80 Exerciser, part number 09800-10560 (5 ¼ inch media) or 09800-10360 (3 ½ inch media).

How to Use this Manual

This manual is designed to meet the needs of both experienced and novice users. Instructions for each are provided below.

Novice Users

This chapter contains a basic introduction to the software. Take a few minutes to look it over before you begin testing—it may save you time in the long run. In particular, check that:

- Your system meets the minimum hardware requirements,
- You have the required accessories for each test you want to run, and
- You understand the basic keyboard operations used to control the tests.

The remainder of the manual is organized into procedure blocks. Each block contains a set of instructions for a particular segment of the System Tests software. For example, Chapter 3 contains a block that describes how to load the software, select a particular type of test, and choose the error-logging device. All system tests share this procedure. However, other procedure blocks are specific to a single test type (e.g., for interface card tests), or in the extreme case, to a single device (e.g., for the GPIO test only).

To help you navigate through the manual, indexes are provided at points in the manual where instructions for one group of tests diverge from the others. All indexes are labelled “Where to Go Next.” Whenever you encounter an index, simply look up the test you are running and skip to the indicated page. There you will find a review of the steps you have already taken, and the continuation of the procedure where you left it.

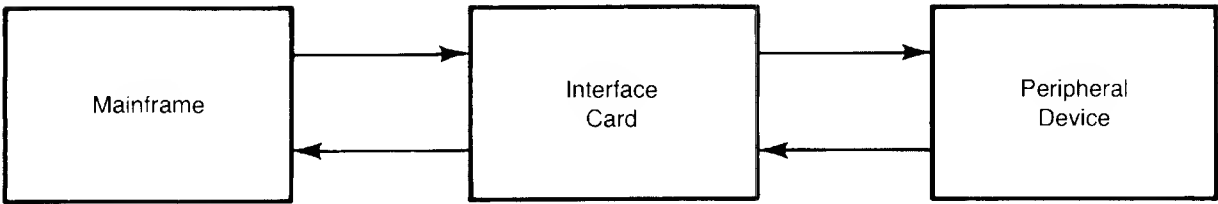
The first index is located at the end of this chapter. Start your testing there, and you will have no problems finding your way around.

Experienced Users

After you have run the tests a few times and become familiar with the software, you may need only a brief summary of running instructions for each test, along with a troubleshooting guide. For this information, look up the test you want to run in the Table of Contents at the beginning of this manual.

Background Information

A typical Series 200 computer system comprises a mainframe, one or more interface cards, and usually one or more peripheral devices (see below).



| Mainframes | Interface Cards | Peripherals |
|-----------------|-----------------|-----------------|
| Model 16 (9826) | Internal HP-IB | Disc Drives |
| Model 20 (9920) | Plug-in HP-IB | Printers |
| Model 26 (9826) | RS-232 | Plotters |
| Model 36 (9836) | GPIO | Graphics Tablet |
| | BCD | |
| | Datacomm | |
| | Color | |
| | Disc | |
| | SRM | |

Typical Series 200 System

The mainframe and the peripherals exchange information through the interface card, which acts much like an interpreter who mediates a discussion between people speaking different languages. Because there is no single standard of information exchange (just as there is no universal language), different interfaces are required for different peripherals. Although the figure above depicts the interface card as a logically distinct component, it is physically plugged into the back of your computer.

The system tests are especially useful for detecting subtle hardware failures in each of these system components. Suppose, for example, you are having trouble reading from an external disc drive. The problem may be with the drive itself, or with the interface it is attached to, or with the computer. You first run the computer tests to see if the computer is operating normally. If no errors are reported, you then run the I/O test for the interface the drive is using. Again if there are no errors, you should run the peripheral exerciser for the model of disc drive you have. In this way, working your way along the data transfer path from computer to peripheral, you can isolate the source of the problem.

If the entire data transfer path from mainframe to interface to disc drive appears to have no faults, there's a good chance that the problem lies not in the hardware but in the software you are running. Look for bugs. If you still come up short, call your service representative for assistance. Although the system tests are very thorough, they may occasionally fail to detect the source of the problem.

If you have extensive hardware failures, the System Tests software probably can't help you. For example, if you have difficulty booting a system, you probably can't boot the system tests either, and if your CRT is unreadable, you won't be able to read and answer the prompts. In this situation, call HP for service. A computer service person can also isolate the problem with the Series 200 Test Card, part number 98206-66501. The test card contains the same tests as System Tests software, but is runnable even when the computer has extensive failures.

When to Run the Tests

You should run the mainframe (computer) tests soon after your computer is installed to detect any existing problems. Contact HP for service if failures are reported. In addition, test all interfaces and peripherals you have in your system. If you add new interfaces and peripherals later, be sure to test them at installation time. Otherwise, run the tests whenever you suspect a problem, or at your own discretion.

The interface listing utility can be run if you need a quick reminder of your system's interface cards and their corresponding select code settings. If one of your interfaces does not appear in the list, check that it is properly plugged into the back of your computer and has its switches set properly. If the problem persists, call HP for service.

The internal disc drive head cleaning utility should be used **only** when you suspect dirty heads are causing data errors. Before using this routine, try initializing a few flexible discs. If no errors occur, the problem is probably not in the heads. If you do decide the heads need cleaning, use the HP 92193A Head Cleaning Accessory Kit.

Note

Cleaning disc drive heads removes a lubricant from the head surface and increases disc media wear.

Hardware Requirements

Any Series 200 computer with at least 131 072 (128K) bytes of random access memory (RAM) can run all system tests except the 98625A Disc Interface Test. The Disc Interface Test requires 262 144 (256K) bytes of RAM.

The Model 16 and Model 20 also require an external flexible disc drive for booting the System Tests program discs. Supported external flexible disc drives include: HP 9121, 9135A, 9133A/B, 82901 and 82902.

The Model 20 must also have a video display and a keyboard connected.

Individual Test Requirements

Many interface tests have additional hardware requirements, most of which are associated with a special data transfer test. The data transfer test checks that the interface is accurately transmitting data between the computer and the peripheral device.

To perform a data transfer test, a mechanism is needed for diverting data passing out of the interface back into the computer where it can be checked. If the data sent out matches the data coming in, data integrity is confirmed. This loop back effect is achieved with test hoods or cables.

If you will be testing an interface that appears in the following headings, make sure you have all required test accessories.

RS-232, GPIO and BCD Interface Tests

BCD and GPIO interface tests both **require** a test hood. A test hood is optional for the RS-232 interface test, but without it, a data transfer test cannot be run. Test hoods are special connectors that plug into the socket on the interface card. With the test connector installed, data passes through the interface output lines and immediately back in through the input lines.

A table of test hood part numbers appears below.

| Interface | Test Hood Part Number |
|---------------|-----------------------|
| 98622A GPIO | 98622-67950 |
| 98623A BCD | 98623-67950 |
| 98626A RS-232 | 98626-67950 |

Internal HP-IB and HP 98624A Plug-in HP-IB Interfaces

Running a data transfer test on an HP-IB interface is optional, but it is strongly recommended for a meaningful exercise. To run a data transfer test, you must have the following additional equipment:

- An additional HP-IB interface (not the one you're testing) to check data transfer, and
- Any HP-IB cable.

The HP 98625A Disc Interface

The data transfer test of the Disc interface is mandatory. The following equipment is required:

- At least 262 144 (256K) bytes of random access memory (RAM),
- An HP 98620A DMA card,
- An internal HP-IB interface to check data transfer, and
- Any HP-IB cable.

System Tests Keyboard Operations

The System Tests software is very simple to use. A series of prompts guide you through the process of setting up to run a test, and all responses are entered with the knob and softkeys. No typing is required.

If you make a mistake, you may back up the prompting sequence at any time by pressing the **Exit** softkey, . This special softkey is defined during all phases of the I/O and peripheral exercises.

Prompts fall into three categories: simple prompts, menu prompts and address prompts. Refer to the following paragraphs for instructions on answering each type of prompt and for details on using the **Exit** softkey.

Simple Prompts

Simple prompts ask you to answer a question by pressing a softkey. To answer a simple prompt, just press the softkey that is defined with your response. For example, the following simple prompt appears in the Computer Tests section of the software:

```
Would you like instructions for the mainframe tests?
```

In this instance, is defined with the answer **Yes** and is defined with the answer **No**. Simply press or to indicate your choice.

Menu Prompts

Menu prompts require a two-step response. A list (menu) of possible answers is displayed on the screen, along with a small arrow that points to one of the answers. When you rotate the knob on the keyboard, the arrow moves up and down the list of answers. Two softkeys (usually and) are defined with the words **Choice Complete**.

To answer a menu prompt, use the knob to position the arrow to point at your answer, then press either one of the **Choice Complete** softkeys.

For example, the following prompt might appear in the I/O tests section of the software:

```
-->  7  HP-IB
      9  RS-232
     12  GPIB
```

```
Use Knob to choose which interface to test.
```

For this prompt, and are defined as **Choice Complete**. To select the internal HP-IB interface (select code 7) for testing, you would position the arrow to point to 7 HP-IB and press , **Choice Complete**.

Address Prompts

Address prompts ask you to specify the HP-IB bus address of a peripheral device by setting a number on the screen. The first one or two digits of the number are preset to the select code of the HP-IB interface the peripheral is using. The final two digits represent the peripheral's bus address and are set by rotating the knob. Consult the peripheral's installation manual if you don't know its bus address. The **Choice Complete** softkeys are defined as in the menu prompts.

To specify the bus address of the peripheral, simply rotate the knob. The last two digits of the number will take on integer values in the range of 0 through 31. When these digits are set to the bus address of your peripheral, simply press either of the **Choice Complete** softkeys.

For example, the following prompt appears if you have chosen to send test errors to a printer on the internal HP-IB:

```
Use the Knob to Pick address of Printer.
```

```
700
```

The first digit (7) is the select code of the internal HP-IB. The last two digits (00) represent the bus address. If your printer is set to bus address 1, you would rotate the Knob until the number 701 appears and then press **Choice Complete**.

The Exit Softkey

The **Exit** softkey is present during all peripheral exercises and interface tests. Pressing **Exit** during the execution of an exercise will terminate it. **Exit** is the only means of stopping an exercise that is in a continuous loop.

Pressing **Exit** while setting up exercise parameters causes the prompting sequence to back up to the preceding prompt. This allows you to change a previous response without starting the exercise from the beginning again.

The **Exit** softkey is disabled during some phases of testing, so if it doesn't respond immediately, keep trying it.

Where to Go Next

| | |
|-----------------------------------|----|
| GPIO Interface Test..... | 7 |
| BCD Interface Test | 7 |
| Internal HP-IB Test | 7 |
| HP 98624A Plug-in HP-IB Test..... | 7 |
| Disc Interface Test | 7 |
| All Other Tests | 11 |

Chapter 2

Interface Configurations

The 98622A GPIO, 98623A BCD, internal HP-IB, 98624A plug-in HP-IB and 98625A Disc interface tests may require some reconfiguration before you turn your computer on. If you intend to run one of these tests, find the appropriate section in this chapter and follow the instructions. Otherwise, go on to Chapter 3, Loading and Running the Tests.

CAUTION

SWITCH THE COMPUTER OFF BEFORE INSTALLING OR REMOVING INTERFACE CARDS FROM THE COMPUTER. INSTALLING OR REMOVING CARDS WHILE THE COMPUTER IS SWITCHED ON MAY DAMAGE THE CARD OR THE COMPUTER.

CAUTION

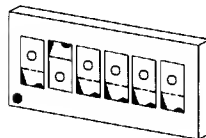
STATIC DISCHARGE CAN DESTROY COMPONENTS ON THE INTERFACE CARD. HANDLE THE CARD WITH ITS ANTI-STATIC ENVELOPE OR BY ITS PLASTIC EXTRACTORS. DO NOT TOUCH THE ELECTRICAL TRACES OR SET THE CARD ON A CHARGED SURFACE (LIKE A CLOTH).

GPIO Interface Configuration

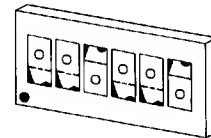
The GPIO interface test requires that the switches on the cards be set a certain way. Follow this procedure:

1. **Turn your computer OFF.** Remove the GPIO interface from the backplane of the computer. Make a note of the current switch settings, then reset the switches as shown in the diagrams below. Refer to your interface installation manual if you have difficulty locating the switches.

PCTL: 1
PFLG: 0
PSTS: 1
HSHK: 1
DIN: 1
DOUT: 1



RD: 1
BSY: 1
RDY: 0
RD: 1
BSY: 1
RDY: 0



2. Return the GPIO interface card to its slot in the computer backplane. Make sure you have the correct test hood as described in Chapter 1. Proceed to Chapter 3, Loading and Running the Tests, for booting instructions.

BCD Interface Configuration

The BCD interface test requires that the switches on the cards be set a certain way. Follow this procedure:

1. **Turn your computer OFF.** Remove the BCD interface from the backplane of the computer. Make a note of the current U15 and U24 switch settings, then reset these switches as shown in the diagrams below. Refer to your interface installation manual if you have difficulty locating the switches.



2. Return the BCD interface card to its slot in the computer backplane. Make sure you have the correct test hood as described in Chapter 1. Proceed to Chapter 3, Loading and Running the Tests, for booting instructions.

Internal HP-IB Interface Configuration

If you want to thoroughly exercise the internal HP-IB interface, you must configure the HP-IB to run a data transfer test. The data transfer test requires two HP-IB interfaces: the internal HP-IB you are testing, and a second, plug-in 98624A HP-IB card to check data transfer.

If you don't have two HP-IBs or don't want to run a data transfer test, no special interface configuration is required. Skip to Chapter 3, Loading and Running the Tests, for further instruction.

If you want to run a data transfer test, configure the two HP-IB interfaces as follows:

- The 98624A plug-in HP-IB must be set to a select code in the range 1 thru 15,
- The internal HP-IB must be set to system controller, and
- The plug-in HP-IB must be set to non-system controller.

If your internal HP-IB is not set to system controller, refer to Appendix A for instructions.

If the plug-in 98624A HP-IB interface is not set to non-system controller, or if its select code is not within the range 1 thru 15, follow the procedure below:

1. **Turn your computer OFF.** Remove the 98624A plug-in HP-IB card from your computer.
2. Configure the card to non-system controller by setting switch 5 of the U17 switch group to 0. Switch 5 is marked "SYS CTL" on the card.
3. If necessary, change the select code switches on the card to an unused select code in the range 1 thru 15. See the card's installation manual for details.
4. Replace the card in your computer.

If you want to use an HP-IB printer as the error-logging device, you must connect it to an interface other than the HP-IBs involved in the data transfer test. Therefore, you must have three HP-IBs in your system: two for the data transfer test and one for the printer. If you don't have three HP-IBs, use the CRT for error-logging.

Proceed to Chapter 3, Loading and Running the Tests, for booting instructions.

HP 98624A HP-IB Interface Configuration

If you want to thoroughly exercise an HP 98624A HP-IB interface, you must configure the HP-IB to run a data transfer test. The data transfer test requires two HP-IB interfaces: the 98624A interface card you are testing, and a second HP-IB (either the internal HP-IB or another 98624A card) to check data transfer.

If you don't have two HP-IBs or don't want to run a data transfer test, no special interface configuration is required. Skip to Chapter 3, Loading and Running the Tests, for further instruction.

If you want to run a data transfer test, configure the two HP-IB interfaces as follows:

- The 98624A plug-in HP-IB you are testing must be set to system controller,
- The second HP-IB interface must be set to non-system controller, and
- Both HP-IBs must be set to unique select codes in the range 1 thru 15.

If the 98624A HP-IB interface card you are testing is not set to system controller, follow the instructions below:

1. **Turn your computer OFF.** Remove the HP 98624A HP-IB card from the backplane of your computer.
2. Set switch 5 of the U17 switch group to 1 to configure the card as system controller. Switch 5 is marked "SYS CTL" on the card.
3. If the card's select code is not in the range 1 thru 15, reset the select code to an unused value in this range. See the installation manual that came with the card for details.
4. Replace the HP 98624A HP-IB card in the computer.

If using another 98624A HP-IB card to check data transfer, set it to non-system controller by following the procedure above, setting switch 5 to 0 instead of 1. Also change the select code switches to an unused value in the range 1 thru 15, if necessary.

If using the internal HP-IB interface to check data transfer, see Appendix A for instructions on changing the system controller setting.

If you want to use an HP-IB printer as the error-logging device, you must connect it to an interface other than the HP-IBs involved in the data transfer test. Therefore, you must have three HP-IBs in your system: two for the data transfer test and one for the printer. If you don't have three HP-IBs, use the CRT for error-logging.

Proceed to Chapter 3, Loading and Running the Tests, for booting instructions.

HP 98625A Disc Interface Configuration

The Disc interface data transfer test uses the internal HP-IB and an HP 98620A DMA card. Your system must be configured as follows:

- The internal HP-IB must be set to non-system controller, and
- The Disc interface card must be set to a select code in the range 1 thru 15.

To set the internal HP-IB to non-system controller, refer to Appendix A.

If the select code of your Disc interface does not fall within the range 1 thru 15, reset the select code switches to an unused value in this range. Refer to the installation manual that accompanied the card for instructions.

If the DMA card is not currently resident in your computer, refer to its installation manual for instructions.

Proceed to Chapter 3, Loading and Running the Tests, for booting instructions.

Chapter 3

Loading and Running the Tests

Start-up Procedure

1. Switch the computer OFF. Look up your computer's default flexible disc drive in the table below. Insert System Tests disc 1 into the default drive and close the door. If the device you are using contains two flexible disc drives, insert System Tests disc 2 into the other drive. Otherwise, you will be prompted at the appropriate time to replace disc 1 with disc 2.

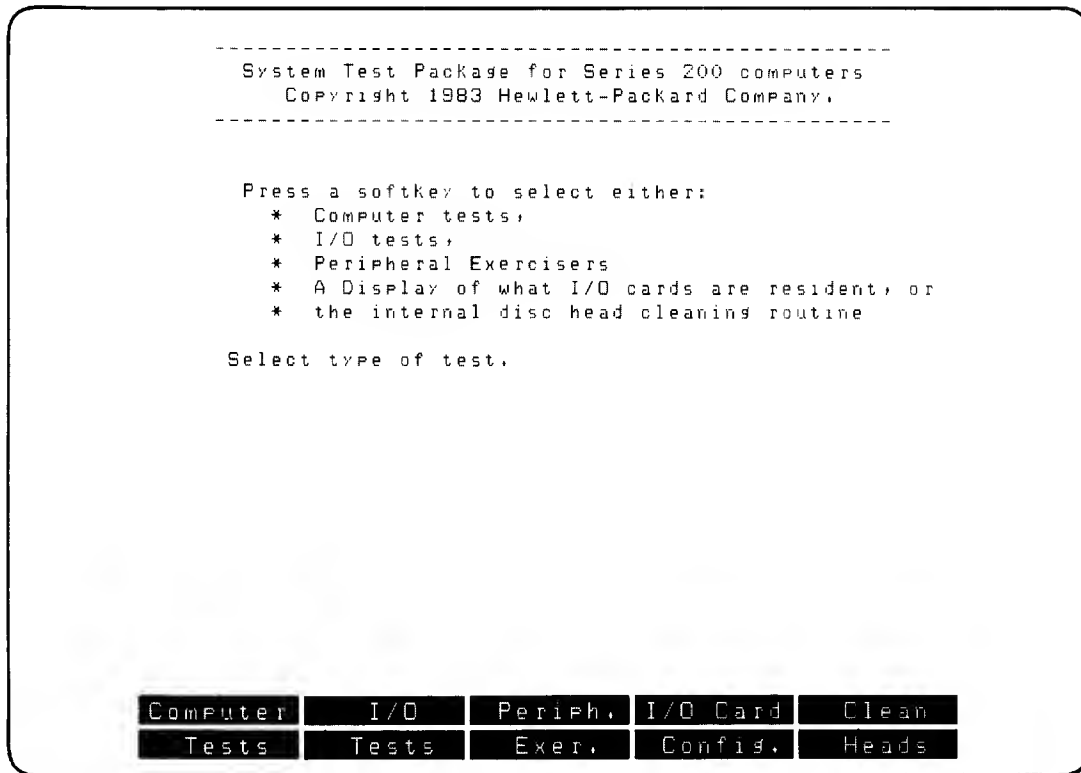
| Model | Default Flexible Disc Drive |
|-------|--|
| 16,20 | See booting instructions in Installation Manual. |
| 26 | Internal drive. |
| 36 | Right-hand internal drive. |

2. Switch the computer ON. The computer automatically performs its memory test. Then the test operating system is loaded from the disc.

When the Test Selection Display appears on the screen, the tests are ready to run.

The Test Selection Display

After loading the system tests operating system, the Test Selection Display will appear on the screen:



Note the softkey definitions at the bottom of the screen. Each type of test has two softkeys associated with it: you may press either one to make your selection.

Computer Tests (k0) or (k5): This option allows you to test several functions of your computer mainframe, including the ROM, RAM, CRT, keyboard and internal disc drives.

I/O Tests (k1) or (k6): This option allows you to test any of the interfaces you may have connected to your computer, including internal or plug-in HP-IB, GPIO, RS-232, Datacomm, Disc, Color Output, SRM and BCD.

Periph. Exer. (k2) or (k7): This option allows you to exercise the peripherals which you have attached to your computer, including external disc drives, printers, plotters and graphics tablets.

I/O Card Config. (k3) or (k8): This option will list on the CRT all interface cards installed in your computer and their corresponding select codes.

Clean Heads (k4) or (k9): This option will guide you through a routine to clean the heads of your internal disc drives (Models 26 and 36).

Press the appropriate softkey to select the type of test you want to run.

Selecting the Error-logging Device

After choosing the type of test you want to run (Computer Tests, I/O Tests, or Periph. Exer.), you will be asked where you want to print errors and instructions that may arise during a test. The following prompt will appear:

```
Where should errors & instructions be Printed?
Use Knob to choose error logging device.
```

The CRT or any HP-IB printer may be designated as the error-logging device. A list of error-logging candidates for your system will appear in the upper left-hand portion of the screen.

Error-logging on the CRT

To choose the CRT as the error-logging device, simply press the **Choice Complete** key, either or .

Error-logging on an HP-IB Printer

To choose a printer as the error-logging device, you must first specify which HP-IB interface the printer is connected to. The select code of each HP-IB in your system is listed in the upper left-hand corner of the screen. Rotate the knob to position the arrow to the correct HP-IB and press **Choice Complete**, or . For example, to select a printer on the internal HP-IB (select code 7), position the arrow to 7 HP-IB and press **Choice Complete**.

Note

The select code of the error-logging printer's HP-IB must be within the range 1 thru 15.

The next prompt asks you to specify the bus address of the printer. Rotate the knob until the bus address number is set to the HP-IB address of your printer, then press the **Choice Complete** softkey. If you don't know the address of your printer, refer to your printer's installation manual. The factory pre-set bus address for HP-IB printers is 1.

Note

Do not specify the peripheral you want to exercise as the error-logging device. If you do this, an error message will be printed and the error-logging device will default to the CRT.

After you specify the address of the error-logging printer, the computer tests the printer to make sure it will respond. If everything is working properly, the message:

```
This is a test of the error logging printer!
```

will be printed on your printer. Otherwise, an error condition exists and you will be told to try again. Make sure the printer is turned on, the HP-IB address you gave is correct, and the printer's 'ON LINE' light is on (if it has one). Also make sure the HP-IB used by the printer is set to system controller (see Appendix A).

Once the error-logging device is chosen, the supervisor program for the type of test you selected is loaded into the computer.

Where to Go Next

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| I/O (Interface Card) Tests | 43 |
| Computer Tests | 61 |

Chapter 4

Peripheral Exercisers


How to Use this Chapter

This chapter describes how to exercise most peripherals supported on a Series 200 Computer. The General Instructions section explains how to set up to run any printer, plotter, disc drive or graphics tablet exerciser. The remaining sections of the chapter contain specific instructions for exercising each device, as well as sample test results and directions for interpreting them.

Read and follow the General Instructions. Then use the index to turn in the manual to the section that describes the specific device you want to test (see Where to Go Next following the General Instructions).

Procedure Review

At this point in the software, you have performed the following tasks:

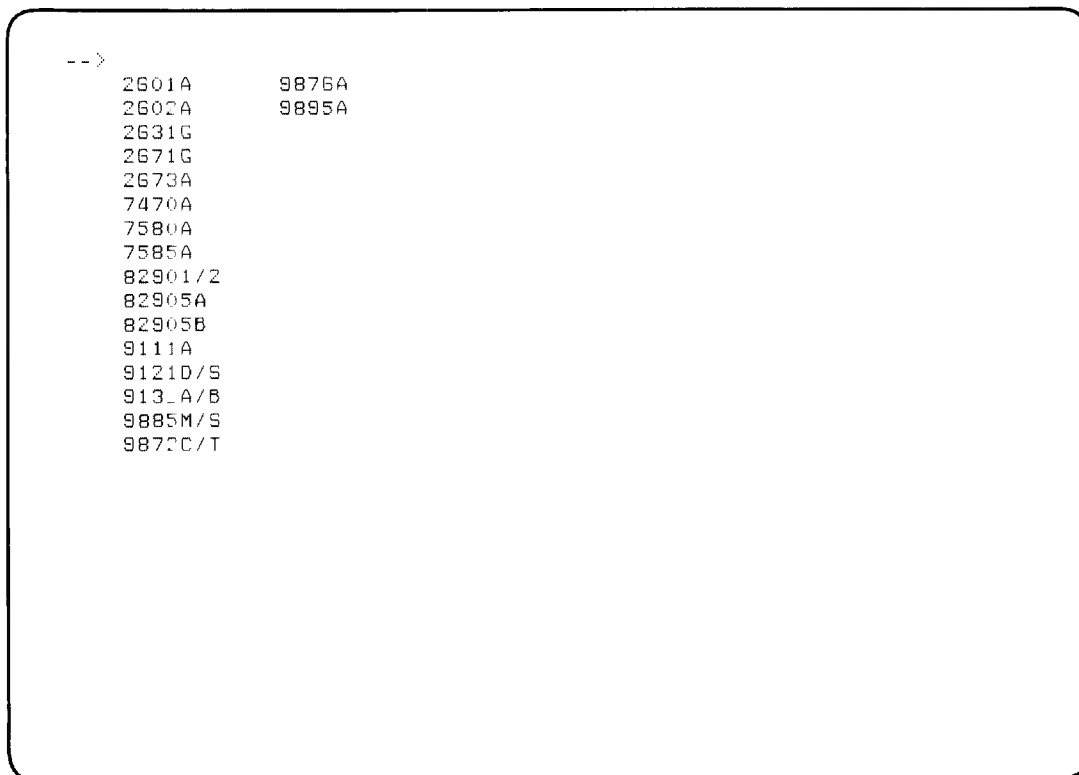
- Loaded the System Tests into your computer.
- Pressed the **Periph. Exer.** softkey  in the Test Selection Display.
- Selected your error-logging device.

You are now ready to specify the peripheral device you want to test.

General Instructions

This section provides general instructions for running a peripheral test. If the device you are testing requires additional instructions, they will appear in the Special Instructions section for that device.

1. **Select the peripheral you wish to test.** After you have specified the error logging device, a menu of peripheral model numbers will appear on the screen:



Using the knob, position the arrow to the device you want to test, then press **Choice Complete**. If the peripheral you want to test does not appear in the list, check with your HP Sales Representative to see if it is supported.

Note

To test an HP-IB device, it must be connected to an HP-IB interface that is set to system controller. The internal HP-IB in the Model 16, 26 and 36 is set to system controller when shipped from the factory.

2. **Select the peripheral's interface.** If you have more than one interface of the type used by the peripheral, you must specify which interface card the peripheral is connected to. A list of all candidate interfaces and their select codes will appear in the upper-left portion of the screen. Using the knob, position the arrow to the select code of the correct interface and press **Choice Complete**. Note that if you have only one interface of the proper type, this prompt will not appear.

If the peripheral's interface fails to appear in the list, check that it is installed correctly. If the problem persists, the interface card may be faulty. Call your HP Service Representative for assistance.

3. **Select HP-IB address of peripheral (HP-IB devices only).** The next prompt to appear on the screen asks you to specify the HP-IB address of the device you are testing:

Use Knob to Pick HP-IB address for peripheral

700

Using the knob, increment the bus address number 700 in the lower-left portion of the screen until the correct address is specified. Press **Choice Complete**. If you don't know the bus address of the device, check the installation manual that came with it.

4. **Select number of test passes.** Now you are asked to press a softkey to indicate how many times the exerciser should be run.

Press: for one pass
 for two passes
 for five passes
 to Loop forever

If using the **Loop** softkey to execute the exerciser continuously, you may exit the loop by pressing the **Exit** softkey, .

5. **Review the test specifications.** A summary of your test specifications now appears on the screen. This information includes:

Peripheral selected and its select code
 Number of passes requested
 Error logging device

Make sure this information correctly defines the test you want to run. If it does not, use the **Exit** softkey to make corrections. Otherwise, look up the peripheral you are testing in the index below and turn to the appropriate page.

Where to Go Next

Printer Exercisers

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Plotter Exercisers

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|---|----|

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
¹ 913_A/B refers to all drives having the model number prefix 913 (e.g., 9133A-B, 9134A-B, and 9135)

HP 2601A Printer Exerciser

This exerciser allows you to check the operation of an HP 2601A Printer. See the General Instructions for information on setting up to run the exerciser.

Procedure Review

At this point in the test you are running, you have performed the following tasks:

1. Loaded the System Tests into your computer.
2. Pressed the **Periph. Exer.** softkey  in the Test Selection Display.
3. Selected your error-logging device.
4. Selected 2601A from the peripheral menu.
5. If more than one RS-232 interface is installed in your computer, you specified which interface the 2601A is connected to.
6. Selected the number of test passes.
7. Reviewed test specifications for accuracy.

Before You Continue

- Check that the printer is “ON LINE.”
- Check that the printer is properly connected to your computer via an RS-232 interface.
- Make sure the paper is correctly aligned at the top-of-form.

Now press the **Start** softkey .

HP 2601A Exerciser Sequence

One pass of this exerciser performs the following tests:

1. Check the printer's identity. If the device found at the specified address is not the 2601A printer, the exercise terminates with an error message.
2. Fill up and print the 2601A's character buffer, producing about 50 lines of printed output.
3. Print out six lines of “The quick brown fox jumped over the lazy dog,” testing the two-color ribbon (if installed), underscore, over-print and shadow-print features.

HP 2601A Exerciser Output

The exerciser produces the following printed output. Compare your results with this one. Keep in mind that your output may differ, depending on which print wheel you're using. Review the Troubleshooting Table below for a list of printing errors to look for.

2601A Exerciser - Pass

1

```
*+,-./0123456789;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abdefghi jklmnopqrstu vwxyz{|}~¢! "$%&'()
456789;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abdefghi jklmnopqrstu vwxyz{|}~¢! "$%&'()*+,-./0123
>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abdefghi jklmnopqrstu vwxyz{|}~¢! "$%&'()*+,-./0123456789;<=
HIJKLMNOPQRSTUVWXYZ[\]^_`abdefghi jklmnopqrstu vwxyz{|}~¢! "$%&'()*+,-./0123456789;<=>?@ABCD
RSTUvwxyz[\]^_`abdefghi jklmnopqrstu vwxyz{|}~¢! "$%&'()*+,-./0123456789;<=>?@ABCDEFGHIJKLMN
^`abdefghi jklmnopqrstu vwxyz{|}~¢! "$%&'()*+,-./0123456789;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[
fghi jklmnopqrstu vwxyz{|}~¢! "$%&'()*+,-./0123456789;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abde
pqrstu vwxyz{|}~¢! "$%&'()*+,-./0123456789;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abdefghi jklmmo
z{|}~¢! "$%&'()*+,-./0123456789;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abdefghi jklmnopqrstu vwxy
"$%&'()*+,-./0123456789;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abdefghi jklmnopqrstu vwxyz{|}~¢!
,-./0123456789;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abdefghi jklmnopqrstu vwxyz{|}~¢! "$%&'()*+
6789;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abdefghi jklmnopqrstu vwxyz{|}~¢! "$%&'()*+,-./012345
@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abdefghi jklmnopqrstu vwxyz{|}~¢! "$%&'()*+,-./0123456789;<=>?
JKLMNQRSTUvwxyz[\]^_`abdefghi jklmnopqrstu vwxyz{|}~¢! "$%&'()*+,-./0123456789;<=>?@ABCD
TUVWXYZ[\]^_`abdefghi jklmnopqrstu vwxyz{|}~¢! "$%&'()*+,-./0123456789;<=>?@ABCDEFGHIJKLMN
^`abdefghi jklmnopqrstu vwxyz{|}~¢! "$%&'()*+,-./0123456789;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[
hi jklmnopqrstu vwxyz{|}~¢! "$%&'()*+,-./0123456789;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abdefg
rstu vwxyz{|}~¢! "$%&'()*+,-./0123456789;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abdefghi jklmnopq
{|}~¢! "$%&'()*+,-./0123456789;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abdefghi jklmnopqrstu vwxyz{
$%&'()*+,-./0123456789;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abdefghi jklmnopqrstu vwxyz{|}~¢! "$
/0123456789;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abdefghi jklmnopqrstu vwxyz{|}~¢! "$%&'()*+,-
89;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abdefghi jklmnopqrstu vwxyz{|}~¢! "$%&'()*+,-./01234567
BCDEFGHIJKLMNQRSTUvwxyz[\]^_`abdefghi jklmnopqrstu vwxyz{|}~¢! "$%&'()*+,-./0123456789;<=>?@A
LMNQRSTUvwxyz[\]^_`abdefghi jklmnopqrstu vwxyz{|}~¢! "$%&'()*+,-./0123456789;<=>?@ABCD
WXYZ[\]^_`abdefghi jklmnopqrstu vwxyz{|}~¢! "$%&'()*+,-./0123456789;<=>?@ABCDEFGHIJKLMN
^`abdefghi jklmnopqrstu vwxyz{|}~¢! "$%&'()*+,-./0123456789;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^
jklmnopqrstu vwxyz{|}~¢! "$%&'()*+,-./0123456789;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abdefghi
tu vwxyz{|}~¢! "$%&'()*+,-./0123456789;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abdefghi jklmnopqrs
~¢! "$%&'()*+,-./0123456789;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abdefghi jklmnopqrstu vwxyz{|}
&'()*+,-./0123456789;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abdefghi jklmnopqrstu vwxyz{|}~¢! "$%
0123456789;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abdefghi jklmnopqrstu vwxyz{|}~¢! "$%&'()*+,-./
;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abdefghi jklmnopqrstu vwxyz{|}~¢! "$%&'()*+,-./0123456789
DEFGHIJKLMNQRSTUvwxyz[\]^_`abdefghi jklmnopqrstu vwxyz{|}~¢! "$%&'()*+,-./0123456789;<=>?@ABC
NQRSTUvwxyz[\]^_`abdefghi jklmnopqrstu vwxyz{|}~¢! "$%&'()*+,-./0123456789;<=>?@ABCDEFGHIJK
XYZ[\]^_`abdefghi jklmnopqrstu vwxyz{|}~¢! "$%&'()*+,-./0123456789;<=>?@ABCDEFGHIJKLMNQRSTUvw
bdefghi jklmnopqrstu vwxyz{|}~¢! "$%&'()*+,-./0123456789;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`a
lmnopqrstu vwxyz{|}~¢! "$%&'()*+,-./0123456789;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abdefghi jk
vwxyz{|}~¢! "$%&'()*+,-./0123456789;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abdefghi jklmnopqrstu
¢! "$%&'()*+,-./0123456789;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abdefghi jklmnopqrstu vwxyz{|}~
()*+,-./0123456789;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abdefghi jklmnopqrstu vwxyz{|}~¢! "$%&'
23456789;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abdefghi jklmnopqrstu vwxyz{|}~¢! "$%&'()*+,-./01
<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abdefghi jklmnopqrstu vwxyz{|}~¢! "$%&'()*+,-./0123456789;
FGHIJKLMNQRSTUvwxyz[\]^_`abdefghi jklmnopqrstu vwxyz{|}~¢! "$%&'()*+,-./0123456789;<=>?@ABCD
PQRSTUvwxyz[\]^_`abdefghi jklmnopqrstu vwxyz{|}~¢! "$%&'()*+,-./0123456789;<=>?@ABCDEFGHIJK
Z[\]^_`abdefghi jklmnopqrstu vwxyz{|}~¢! "$%&'()*+,-./0123456789;<=>?@ABCDEFGHIJKLMNQRSTUvwxy
defghi jklmnopqrstu vwxyz{|}~¢! "$%&'()*+,-./0123456789;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abo
nopqrstu vwxyz{|}~¢! "$%&'()*+,-./0123456789;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abdefghi jklm
xyz{|}~¢! "$%&'()*+,-./0123456789;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abdefghi jklmnopqrstu
!"#$%&'()*+,-./0123456789;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abdefghi jklmnopqrstu vwxyz{|}~¢
*+,-./0123456789;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abdefghi jklmnopqrstu vwxyz{|}~¢! "$%&'()
```

```
THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG.
THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG.
THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG.
THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG.
THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG.
THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG.
```

Troubleshooting Table


| Problem | Solution |
|--|--|
| Missing characters or uneven character spacing | Probable printhead malfunction. Call for service. |
| Uneven print intensity | Replace worn ribbon. |

HP 2602A Printer Exerciser

This exerciser allows you to check the operation of an HP 2602A Printer. See the General Instructions for information on setting up to run the exerciser.

Procedure Review

At this point in the test you are running, you have performed the following tasks:

1. Loaded the System Tests into your computer.
2. Pressed the **Periph. Exer.** softkey  in the Test Selection Display.
3. Selected your error-logging device.
4. Selected 2602A from the peripheral menu.
5. If more than one HP-IB is installed in your computer, you specified which interface the 2602A is connected to.
6. Specified the bus address of the 2602A.
7. Selected the number of test passes.
8. Reviewed test specifications for accuracy.

Before You Continue

- Check that the printer is “ON LINE.”
- Check that the printer is properly connected to your computer via an HP-IB interface that is set to system controller.
- Make sure the paper is correctly aligned at the top-of-form.

Now press the **Start** softkey .

HP 2602A Exerciser Sequence

One pass of this exerciser performs the following tests:

1. Check the printer's identity. If the device found at the specified address is not the 2602A printer, the exercise terminates with an error message.
2. Print out several lines of characters, testing horizontal spacing.
3. Test vertical spacing: 3, 6 and 8 lines per inch.
4. Run the printer's self test and report any errors.

HP 2602A Exerciser Output

The exerciser produces the following printed output. Compare your results with this one. Keep in mind that your output may differ, depending on which print wheel you're using. Review the Troubleshooting Table below for a list of printing errors to look for.

2602A Exerciser - Pass

1

ALL CHARACTERS

[illegible]

3 Lines per inch

6 Lines per inch

8 Lines per inch

Reset Lines /in

HP2602A_selftest_REV-04

rank

rank

C!~!"\$%&'()*+,-./0123456789;<=>?@ABCDEFGHIJKLMNQRSTUWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~^- C!~!"\$%&'()*+,-./0123456789;<=>?@ABCDEFGHIJKLMNQRSTUWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~^-
 !~!"\$%&'()*+,-./0123456789;<=>?@ABCDEFGHIJKLMNQRSTUWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~^- C!~!"\$%&'()*+,-./0123456789;<=>?@ABCDEFGHIJKLMNQRSTUWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~^-
 "\$%&'()*+,-./0123456789;<=>?@ABCDEFGHIJKLMNQRSTUWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~^- C!~!"\$%&'()*+,-./0123456789;<=>?@ABCDEFGHIJKLMNQRSTUWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~^-
 \$%&'()*+,-./0123456789;<=>?@ABCDEFGHIJKLMNQRSTUWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~^- C!~!"\$%&'()*+,-./0123456789;<=>?@ABCDEFGHIJKLMNQRSTUWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~^-
 %&'()*+,-./0123456789;<=>?@ABCDEFGHIJKLMNQRSTUWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~^- C!~!"\$%&'()*+,-./0123456789;<=>?@ABCDEFGHIJKLMNQRSTUWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~^-

Troubleshooting Table


| Problem | Solution |
|--|---|
| Missing characters or uneven character spacing | Probable printhead malfunction. Call for service. |
| Uneven print intensity | Replace worn ribbon. |

HP 2631G Printer Exerciser

This exerciser allows you to check the operation of an HP 2631G Printer. See the General Instructions for information on setting up to run the exerciser.

Procedure Review

At this point in the test you are running, you have performed the following tasks:

1. Loaded the System Tests into your computer.
2. Pressed the **Periph. Exer.** softkey  in the Test Selection Display.
3. Selected your error-logging device.
4. Selected 2631G from the peripheral menu.
5. If more than one HP-IB is installed in your computer, you specified which interface the 2631G is connected to.
6. Specified the bus address of the 2631G.
7. Selected the number of test passes.
8. Reviewed test specifications for accuracy.

Before You Continue

- Check that the printer is “ON LINE.”
- Check that the printer is properly connected to your computer via an HP-IB interface that is set to system controller.
- Make sure you have 14-inch wide paper loaded and correctly aligned at the top-of-form.

Now press the **Start** softkey .

HP 2631G Exerciser Sequence

One pass of this exerciser performs the following tests:

1. Check the printer's identity. If the device found at the specified address is not the 2631G printer, the exercise terminates with an error message.
2. Run the printer's self test and report any errors.
3. Print out all character ROMs in the printer. Character ROMs are read-only memory chips that contain a particular character set. The 2631G output given below has ROM 0, 1, 2 and 3 characters. Expanded characters and 7.2 characters-per-inch characters are then printed. Your printer may have different character sets.
4. Test vertical line spacing.
5. Run a graphics test.

HP 2631G Exerciser Output

The exerciser produces the following printed output. Compare your results with this one. Review the Troubleshooting Table below for a list of printing errors to look for.

2631G Self Test - Pass 1

[illegible]

Troubleshooting Table


| Problem | Solution |
|--|--|
| Missing horizontal lines or uneven character spacing | Probable printhead malfunction. Call for service. |
| Uneven print intensity | Replace worn ribbon. |

HP 2671G Printer Exerciser

This exerciser allows you to check the operation of an HP 2671G Printer. See the General Instructions for information on setting up to run the exerciser.

Procedure Review

At this point in the test you are running, you have performed the following tasks:

1. Loaded the System Tests into your computer.
2. Pressed the **Periph. Exer.** softkey  in the Test Selection Display.
3. Selected your error-logging device.
4. Selected 2671G from the peripheral menu.
5. If more than one HP-IB is installed in your computer, you specified which interface the 2671G is connected to.
6. Specified the bus address of the 2671G.
7. Selected the number of test passes.
8. Reviewed test specifications for accuracy.

Before You Continue

- Check that the printer is properly connected to your computer via an HP-IB interface that is set to system controller.
- Make sure the paper is correctly aligned at the top-of-form.

Now press the **Start** softkey .

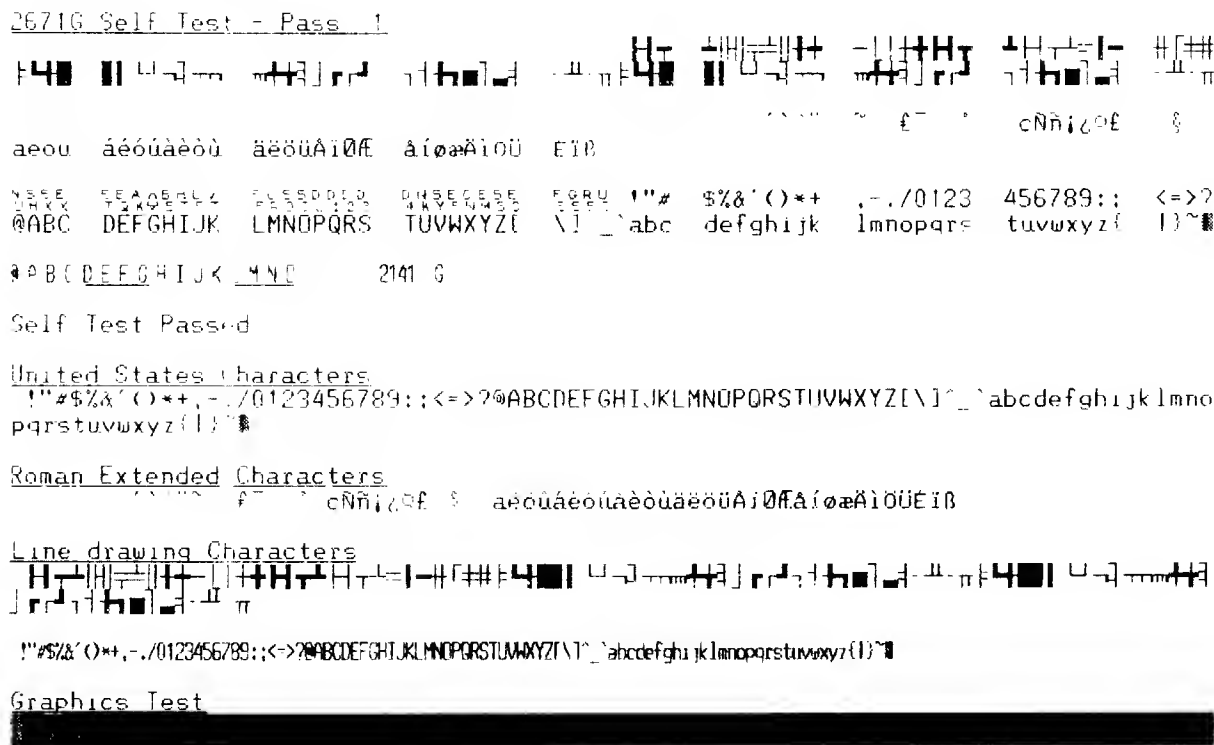
HP 2671G Exerciser Sequence

One pass of this exerciser performs the following tests:

1. Check the printer's identity. If the device found at the specified address is not the 2671G printer, the exercise terminates with an error message.
2. Run the printer's self test and report any errors.
3. Print out all character sets in the printer. Common 2671G characters include United States characters, Roman extended characters and line drawing characters.
4. Run a graphics test.

HP 2671G Exerciser Output

The exerciser produces the following printed output. Compare your results with this one. Review the Troubleshooting Table below for a list of printing errors to look for.



Troubleshooting Table


| Problem | Solution |
|--|--|
| Missing horizontal lines or uneven character spacing | Probable printhead malfunction. Call for service. |
| Uneven print intensity | Replace bad paper |

HP 2673A Printer Exerciser

This exerciser allows you to check the operation of an HP 2673A Printer. See the General Instructions for information on setting up to run the exerciser.

Procedure Review

At this point in the test you are running, you have performed the following tasks:

1. Loaded the System Tests into your computer.
2. Pressed the **Periph. Exer.** softkey  in the Test Selection Display.
3. Selected your error-logging device.
4. Selected 2673A from the peripheral menu.
5. If more than one HP-IB is installed in your computer, you specified which interface the 2673A is connected to.
6. Specified the bus address of the 2673A.
7. Selected the number of test passes.
8. Reviewed test specifications for accuracy.

Before You Continue

- Check that the printer is properly connected to your computer via an HP-IB interface that is set to system controller.
- Make sure the paper is correctly aligned at the top-of-form.

Now press the **Start** softkey .

HP 2673A Exerciser Sequence

One pass of this exerciser performs the following tests:


1. Check the printer's identity. If the device found at the specified address is not the 2673A printer, the exercise terminates with an error message.
2. Run the printer's self test and report any errors.
3. Print out all character sets in the printer. The 2673A output given below has United States characters, Danish/Norwegian character, Roman Extended characters, French characters, German characters, Japanese ASCII characters, United Kingdom characters, Spanish characters, Swedish/Finnish characters, HPL characters, Line Drawing characters, expanded characters and compressed characters.
4. Run a graphics test.

HP 82905A Printer Exerciser

This exerciser allows you to check the operation of an HP 82905A Printer. See the General Instructions for information on setting up to run the exerciser.

Procedure Review

At this point in the test you are running, you have performed the following tasks:

1. Loaded the System Tests into your computer.
2. Pressed the **Periph. Exer.** softkey  in the Test Selection Display.
3. Selected your error-logging device.
4. Selected 82905A from the peripheral menu.
5. If more than one HP-IB is installed in your computer, you specified which interface the 82905A is connected to.
6. Specified the bus address of the 82905A.
7. Selected the number of test passes.
8. Reviewed test specifications for accuracy.

Before You Continue

- Check that the printer is “ON LINE.”
- Check that the printer is properly connected to your computer via an HP-IB interface that is set to system controller.
- Make sure the paper is correctly aligned at the top-of-form.

Now press the **Start** softkey .

HP 82905A Exerciser Sequence

One pass of this exerciser performs the following tests:

1. Check the printer's identity. If the device found at the specified address is not the 82905A printer, the exercise terminates with an error message.
2. Test the beeper, then run the printer's self test and report any errors.
3. Print out all character sets in the printer. The 82905A output given below has Normal characters, expanded characters and compressed characters.
4. Test vertical spacing.
5. Run a graphics test.

HP 82905A Exerciser Output

The exerciser produces the following printed output. Compare your results with this one. Review the Troubleshooting Table below for a list of printing errors to watch for.

82905A Exerciser - Pass 1

Normal Characters

```
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN
PQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~
```

Expanded Characters

```
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN
PQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~
```

Compressed Characters

```
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN
PQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~
```

6 Lines per inch

9 Lines per inch

12 Lines per inch

Reset Ribbon

Graphics test

** 82905 does not do 98X6 "Dump Graphics" **

Troubleshooting Table


| Problem | Solution |
|--|--|
| Missing horizontal lines or uneven character spacing | Probable printhead malfunction. Call for service. |
| Uneven print intensity | Replace worn ribbon. |

HP 82905B Printer Exerciser

This exerciser allows you to check the operation of an HP 82905B Printer. See the General Instructions for information on setting up to run the exerciser.

Procedure Review

At this point in the test you are running, you have performed the following tasks:

1. Loaded the System Tests into your computer.
2. Pressed the **Periph. Exer.** softkey  in the Test Selection Display.
3. Selected your error-logging device.
4. Selected 82905B from the peripheral menu.
5. If more than one HP-IB is connected to your computer, you specified which interface the 82905B is connected to.
6. Specified the bus address of the 82905B.
7. Selected the number of test passes.
8. Reviewed test specifications for accuracy.

Before You Continue

- Check that the printer is “ON LINE.”
- Check that the printer is properly connected to your computer via an HP-IB interface that is set to system controller.
- Make sure the paper is correctly aligned at the top-of-form.

Now press the **Start** softkey .

HP 82905B Exerciser Sequence

One pass of this exerciser performs the following tests:

1. Check the printer's identity. If the device found at the specified address is not the 82905B printer, the exercise terminates with an error message.
2. Run the printer's self test and report any errors.
3. Print out all character sets in the printer. The 82905B output given below shows primary, secondary, expanded, compressed, compressed/expanded and emphasized characters.
4. Test vertical spacing.
5. Run a graphics test.

HP 82905B Exerciser Output

The exerciser produces the following printed output. Compare your results with this one. Review the Troubleshooting Table below for a list of printing errors to watch for.

```
82905B Exerciser - Pass 1

Primary Characters
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN
OPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~

Secondary Characters
~^_`abcdefghijklmnopqrstuvwxyz{|}~
"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN
OPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~

Expanded Characters
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN
OPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~

Compressed Characters
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN
OPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~

Comp/Exp Characters
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN
OPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~

Emphasized Characters
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN
OPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~

6 Lines per inch
9 Lines per inch
12 Lines per inch
15 Lines per inch
Reset Ribbon

Graphics test
** 82905 does not do 98X6 "Dump Graphics" **
```

Troubleshooting Table


| Problem | Solution |
|--|--|
| Missing horizontal lines or uneven character spacing | Probable printhead malfunction. Call for service. |
| Uneven print intensity | Replace worn ribbon. |

HP 9876A Printer Exerciser

This exerciser allows you to check the operation of an HP 9876A Printer. See the General Instructions for information on setting up to run the exerciser.

Procedure Review

At this point in the test you are running, you have performed the following tasks:

1. Loaded the System Tests into your computer.
2. Pressed the **Periph. Exer.** softkey  in the Test Selection Display.
3. Selected your error-logging device.
4. Selected 9876A from the peripheral menu.
5. If more than one HP-IB is installed in your computer, you specified which interface the 9876A is connected to.
6. Specified the bus address of the 9876A.
7. Selected the number of test passes.
8. Reviewed test specifications for accuracy.

Before You Continue

- Check that the printer is properly connected to your computer via an HP-IB interface that is set to system controller.
- Make sure the paper is correctly aligned at the top-of-form.

Now press the **Start** softkey .

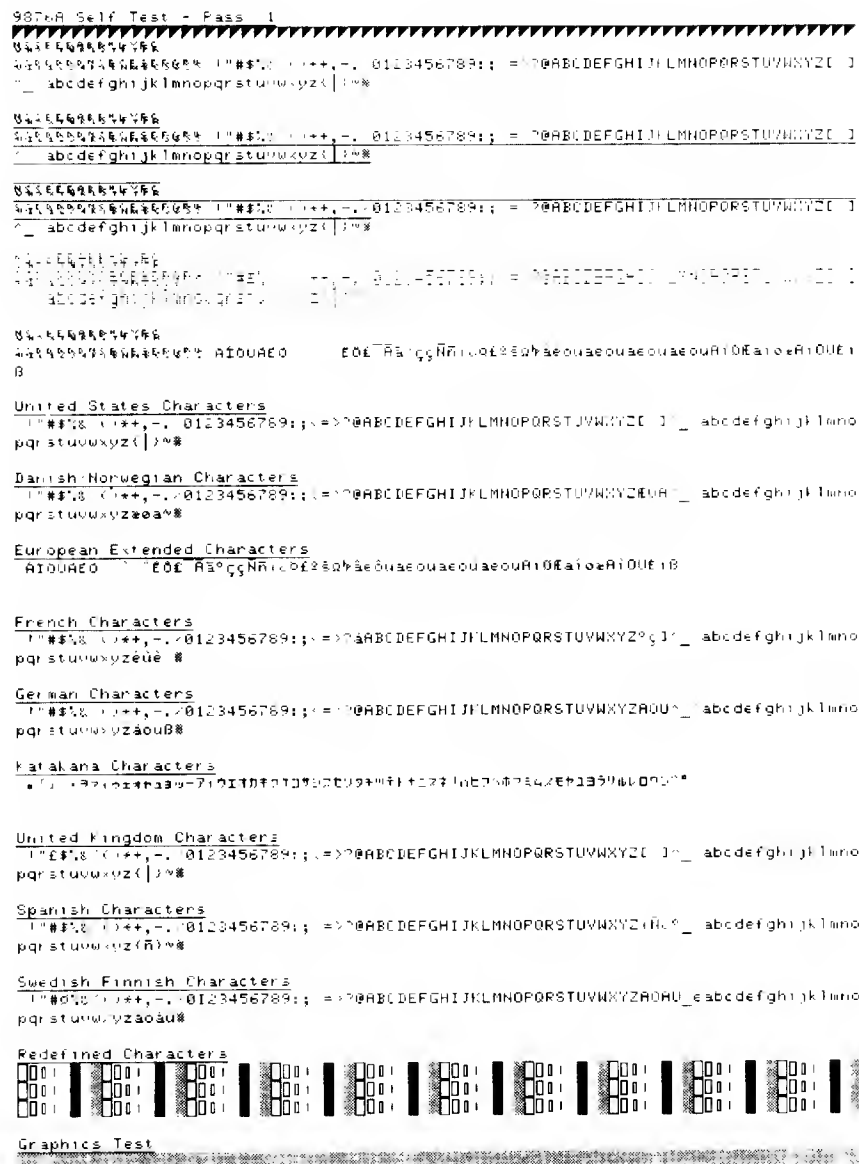
HP 9876A Exerciser Sequence

One pass of this exerciser performs the following tests:

1. Check the printer's identity. If the device found at the specified address is not the 9876A printer, the exercise terminates with an error message.
2. Run the printer's self test and report any errors.
3. Print out all character sets in the printer. The 9876A output given below has United States characters, Danish/Norwegian characters, European Extended characters, French characters, German characters, Katakana characters, United Kingdom characters, Spanish characters, Swedish/Finnish characters and user-definable characters.
4. Run a graphics test.

HP 9876A Exerciser Output

The exerciser produces the following printed output. Compare your results with this one. Review the Troubleshooting Table below for a list of printing errors to look for.



Troubleshooting Table

| Problem | Solution |
|-------------------------------------|---|
| Vertical line of missing dots | Probable printhead malfunction. Call for service. |
| Uneven print intensity ¹ | Replace paper. If problem persists, call for service. |

1 Check print intensity on sawtooth pattern at the top of the page


HPGL Plotter Exercisers

(HP 7470A, 7580A, 7585A and 9872C/T)

These exercisers allow you to check the operation of any of your Series 200 supported HPGL plotters. See the General Instructions at the beginning of this chapter for information on setting up to run the exercisers.

Procedure Review

At this point in the test you are running, you have performed the following tasks:

1. Loaded the System Tests into your computer.
2. Pressed the **Periph. Exer.** softkey  in the Test Selection Display.
3. Selected your error-logging device.
4. Selected the plotter you want to test from the peripheral menu.
5. If more than one HP-IB is installed in your computer, you specified which interface the plotter is connected to.
6. Specified the HP-IB bus address of your plotter.
7. Selected the number of test passes.
8. Reviewed test specifications for accuracy.

Before You Continue

- Check that the plotter is properly connected to your computer via an HP-IB interface that is set to system controller.
- Check that the plotter is turned on.

Now press the **Start** softkey .


Special Instructions

After you press the **Start** softkey to begin exercising, the following prompt will appear on the screen:

```
Load Paper, set P1 & P2, Press 'Continue' softkey.
```

This step is asking you to load the paper and set the plotter limits to correspond to the size of the paper. If you are not familiar with this procedure, consult the operator's manual that came with your plotter.

If you are testing an HP 7580A or 7585A, also make sure the Remote light is on.

Once this step is completed, press the **Continue** softkey, .

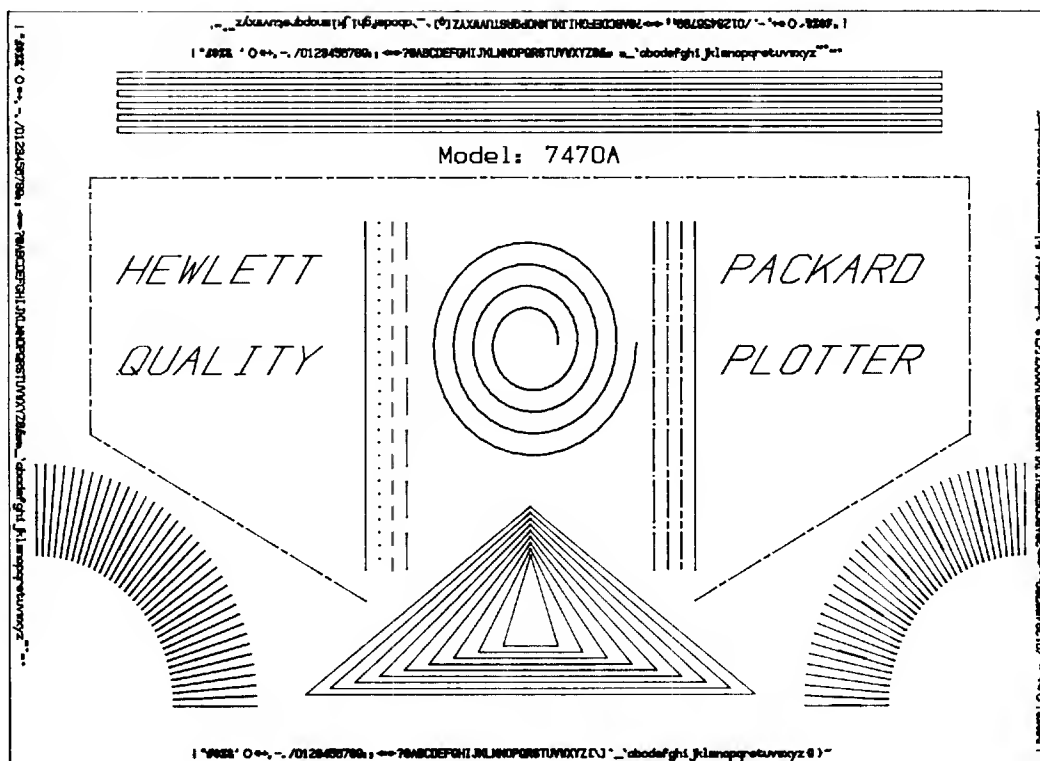
Plotter Exerciser Sequence

All plotter exercisers follow the same exercising sequence:

1. Check the plotter's identity. If the device found at the specified HP-IB address is not the plotter you selected from the peripheral list, the exercise terminates with an error message.
2. Run the standard plotter test. The plotter test plots an elaborate diagram designed to exercise every possible motion of the plotter arm. This diagram should be visually checked for the problems listed in the Problems section. If you find an error on the plot, consult the Solutions section for corrective action.

Plotter Exerciser Output

Each of the plotter exercisers generates a plot like the one below.



Troubleshooting Table

| Problem | Solution |
|--------------------------------|------------------------|
| Fuzzy alphabetic characters | Replace worn pens. |
| Lines are not parallel | Call for service. |
| Nonconcentric or jagged spiral | Reset P1 & P2, retest. |
| Triangles' lines don't connect | Call for service. |
| Corner fans are blurred | Call for service. |
| Missing line types | Call for service. |

Disc Drive Exercisers

(HP 82901/2, 9121D/S, 9133A/B, 9134A/B, 9135, 9885M/S and 9895A)

These exercisers allow you to check the operation of the Series 200 supported disc drives listed above. See the General Instructions at the beginning of this chapter for instructions on setting up to run the exercisers.

Procedure Review

At this point in the test you are running, you have performed the following tasks:

1. Loaded the System Tests into your computer.
2. Pressed the **Periph. Exer.** softkey in the Test Selection Display.
3. Selected your error-logging device.
4. Selected the disc drive you want to test from the peripheral menu.
5. If more than one interface of the type used by the drive is installed in your computer, you specified which interface the drive is connected to.
6. Specified the HP-IB bus address of your drive (HP-IB drives only).
7. Selected the number of test passes.
8. Reviewed test specifications for accuracy.

Before You Continue

- You must insert an initialized disc into the drive before the exercise can proceed. Information on the disc will not be harmed by the exercise. However, if you suspect that the drive is malfunctioning, **do not insert valuable media into the drive.**
- Make sure the drive is turned on and properly connected to the computer. If it is an HP-IB drive, make sure it is connected to an HP-IB that is set to system controller.

Now press the **Start** softkey .

Special Instructions (all drives)

After you press the **Start** softkey, the following prompt will appear on the screen:

Which drive do you wish to test?

The softkeys for this prompt are defined as follows:

- | | |
|-----------------------------------|------------------------|
| <input type="button" value="k0"/> | - Drive 0 |
| <input type="button" value="k1"/> | - Drive 1 |
| <input type="button" value="k2"/> | - Drive 2 ¹ |
| <input type="button" value="k3"/> | - Drive 3 ¹ |
| <input type="button" value="k4"/> | - All |

Press the appropriate softkey to indicate your choice.

¹ Not an option when testing an HP 9121D/S drive.

Note that, in some cases, the exerciser cannot detect how many drives are present in your device before the exercise has actually begun. Therefore, it is possible to answer the prompt above with a drive number that does not exist. For example, if you choose drive 3 and your device has only two drives in it, the exercise will fail to locate a drive 3 and will terminate with an error message. If you don't know how many drives are contained in your device, press **All**.

k4.

If you select a flexible disc drive for test, you are then prompted to insert an initialized disc into that drive. Again, if you suspect the drive is faulty, don't insert a disc containing valuable information. Press the **Continue** softkey, **k0**, to proceed with the exercise.

Special Instructions (HP 9133A/B and HP 9135 only)

The HP 9133A/B and HP 9135 contain both hard and flexible disc drives, and each is set to a different bus address. When you select 913_ in the peripheral list to exercise an HP 9133 or HP 9135, only the hard, fixed disc drive will be tested. To exercise the flexible disc drive in each of these devices, select 9121 from the peripheral list and enter the bus address of the HP 9133A/B's or HP 9135's flexible drive in response to the bus address prompt.

Disc Drive Exerciser Sequence

All disc drive exercisers follow the same basic test sequence:

1. Check the disc drive's identity. If the device found at the specified address is not the disc drive you selected from the peripheral list, the exercise terminates with an error message.
2. Run the disc drive's self test if it has one and report the results.
3. Write test data onto the disc.
4. Read the test data just written on the disc. Report errors if the test data that was written to the disc is different from the information just read.

Test Error Messages

- No drive number **X** or no usable disc
- Read/Write Error
- Self test error
- Device will not clear

Interpreting Error Messages

If the exerciser reports no drive number **X** or no usable disc, make sure you have not selected a non-existent drive number in response to the drive number prompt (see Special Instructions above). No drive number **X** is often reported when you select the **All** softkey. In this situation, the exerciser searches the device for drives 0 thru 3 and reports any drives it cannot find. If your device doesn't have four drives, just ignore this message. If the drive number was correct, re-run the test using a different initialized disc. If the problem persists, call your service representative.

A Read/Write error occurs when the exerciser writes information to the test disc, reads it back, and finds the information changed. Don't be alarmed if this happens infrequently; random Read/Write errors are unavoidable. However, if you run the test again and this error recurs, or you notice this error occurring on a regular basis, run the test again using a different flexible disc. If the problem persists, call your service representative for assistance.

Both self test and device clear errors may indicate a problem. Run the test again, and if the same error appears, call your service representative for assistance.

HP 9111A Graphics Tablet Exerciser

This exerciser allows you to check the operation of the HP 9111A Graphics Tablet. See the General Instructions at the beginning of this chapter for instructions on setting up to run the exerciser.

Procedure Review

At this point in the test you are running, you have performed the following tasks:

1. Loaded the System Tests into your computer.
2. Pressed the **Periph. Exer.** softkey (**k2**) in the Test Selection Display.
3. Selected your error-logging device.
4. Selected 9111A from the peripheral menu.
5. If more than one HP-IB is installed in your computer, you specified which interface the 9111A is connected to.
6. Specified the HP-IB bus address of your 9111A.
7. Selected the number of test passes.
8. Reviewed test specifications for accuracy.

Before You Continue

- Make sure the graphics tablet is properly connected to your computer via an HP-IB interface that is set to system controller.
- Because this is an interactive exercise, it is recommended that you read the Special Instructions and 9111A Exerciser Sequence sections before you press **Start**. This will give you an idea of the exercise flow and prepare you to answer the prompts.

Now press the **Start** softkey (**k0**).

Special Instructions

The exerciser will ask you to assist in the testing by performing a few simple tasks. Your participation is optional; however, your cooperation will result in a more thorough test.

The **Continue** softkey (**k0**) allows you to speed execution of the exercise. All steps in the exercises pause a certain number of seconds to allow the user to respond to the instructions if he so chooses. Pressing the **Continue** softkey after each prompt eliminates this pause.

9111A Exerciser Sequence

1. The three colored lights in the upper right corner of the device will blink following the prompt:

In 5 seconds the 3 LED's should blink.

The stylus must not touch the tablet surface during this phase of the test. Otherwise, a warning will sound and the following error message will be printed on the error-logging device:

Selftest Error: 50
Pen must be off Platen.

2. The exerciser asks you to digitize the dot in the lower right corner of the tablet surface with the prompt:

Press the stylus to dot in lower right corner.

- If you choose to honor this request, the tablet will reply with a chirp.
- If you press the stylus to a point other than the dot in the lower right corner, or if the tablet is not functioning properly, the tablet will sound a warning and print the following error message on the error-logging device:

Selftest Error: 53
Wrong stylus position.

3. The next prompt instructs you to:

Press stylus to Menu Box #1

- If you follow these instructions, the 'DIGITIZE' light will come on.
 - If you ignore the request, the following message will be printed on the CRT:
- No Menu Box selected.
- If you press the stylus to a menu box other than #1, or if the tablet is malfunctioning, an error message will be printed on the error-logging device:

Wrong Menu selected.

4. Now you are told to:

Press stylus to Platen.

- If you ignore this instruction, the following message will appear on the CRT:
- No Point Digitized
- If you touch the stylus to a random point on the platen, the exerciser will report the coordinates of the point on the CRT:

Digitized Point: x-coordinate y-coordinate

5. The last actual test in the exercise plays a melody on the tablet.
6. Finally, you are told to remove the stylus from the platen. This is particularly important if you are running the exercise in a loop, for when the exercise wraps around to step 1, an error will occur if the stylus is resting on the platen.

9111A Exerciser Output

Below a representative output is reproduced for a single pass of the exerciser:

```
9111A Exerciser
HP-IB Address  706
  1 Passes requested
Completed Pass  1
Exercise Completed
```

Problems and Solutions

If the exerciser reports an error, run the test again. If the error recurs, call your service representative for assistance. Be careful that the error was not caused by your failure to perform a task that the exerciser requested of you, or by a mistake you made while performing a task.

Chapter 5

I/O Tests


How to Use this Chapter

This chapter describes how to exercise any Series 200 interface. The Interface Test General Instructions explain the basic procedure for setting up to run an interface test. While all interface tests contain all steps described here, some may also contain additional prompts specific to the interface type. Such prompts are explained in the individual interface sections which make up the remainder of the chapter.

Read the Interface Test General Instructions section for an overview of the interface prompting sequence. Then proceed to the section of the manual that describes the specific interface you want to test (see the Where to Go Next section following the general instructions).

Procedure Review

At this point in the software, you have performed the following tasks:

- Loaded the System Tests from the program discs.
- Pressed the **I/O Tests** softkey  in the Test Selection Display.
- Selected your error-logging device.

You are now ready to specify the interface you want to test.

General Instructions

This section provides general instructions for testing an interface card. If the interface you are testing requires additional instructions, they will appear in the Special Instructions section for that interface.

1. **Select the interface you wish to test.** After you have specified the error logging device, a list of all interface cards installed in your computer will appear in the upper left corner of the screen. For instance, if you have an internal HP-IB, a GPIO at select code 12, and an RS-232 at select code 9, your display would look like this:

```
-->
    7  HP-IB
    9  RS-232
   12  GPIO
```

Using the knob, position the arrow to the interface you want to test, then press **Choice Complete**.

Note

Disconnect all devices on the interface you are testing before proceeding.

2. **(BCD, GPIO and RS-232 interfaces only)** After selecting a BCD, GPIO or RS-232 interface from the interface list, a prompt appears asking if you have an interface test hood. If you have a test hood, press **Yes** , otherwise press **No** . The BCD and GPIO tests will not run without a test hood; only the interface card configuration will be displayed. The test hood for the RS-232 test is optional, but a data transfer test cannot be run without it.
3. **(Internal and 98624A Plug-in HP-IB interfaces only)** After selecting an HP-IB interface from the interface list, a prompt appears asking if you have a second HP-IB interface to check data transfer. All additional HP-IB interfaces appear in the upper left corner of the CRT; if no other HP-IBs are detected, "None" will appear. Using the knob, position the arrow to the HP-IB you will use for the second interface, and press **Choice Complete** . If you do not specify a second interface, no data transfer test will be performed.
4. **Select number of test passes.** Now you are asked to press a softkey to indicate how many times the test should be run.

Press: for one pass
 for two passes
 for five passes
 to Loop forever

If using the **Loop** softkey to execute the test continuously, you may exit the loop by pressing the **Exit** softkey, .

5. **Review the test specifications.** A summary of your test specifications now appears on the screen. This information includes:

- Interface selected and its select code
- Reminder of any required connections, if applicable
- Number of passes requested
- Error logging device

If this information is not correct, back up the prompt sequence via the **Exit** softkey to make your corrections. Otherwise, look up the test you are running in the index below and turn to the appropriate page.

Where to Go Next

| | |
|---|----|
| HP 98622A GPIO Interface | 46 |
| HP 98623A BCD Interface | 47 |
| HP 98624A HP-IB Interface | 49 |
| HP 98625A Disc Interface | 50 |
| HP 98626A RS-232 Interface | 51 |
| HP 98627A Color Output Interface | 53 |
| HP 98628A and 98691A Datacomm Interface | 54 |
| HP 98629A SRM (Resource Management) Interface | 56 |
| Internal HP-IB Interface | 57 |
| HP 98620A DMA Card | 59 |

HP 98622A GPIO Interface Test

The test allows you to check the operation of an HP 98622A GPIO interface card. The instructions below provide an abbreviated procedure for setting up and running the exerciser; for more detailed instructions, refer to the General Instructions at the beginning of this chapter.

Procedure Review

At this point in the software, you have performed the following tasks:

1. Set the switches on the GPIO card according to directions in Chapter 2.
2. Loaded the System Tests from the program discs.
3. Pressed the **I/O Tests** softkey in the Test Selection Display.
4. Selected your error-logging device.
5. Selected GPIO from the interface menu.
6. Answered the test hood prompt with **Yes** if you want testing to be done.
7. Selected the number of test passes.
8. Reviewed the test specifications summary.

Before You Continue

- Disconnect all devices from the GPIO interface.
- Connect the GPIO test hood to the socket on the interface card.

Start the Test

Now press **Start** to begin the test.

After the test is finished, turn your computer off, remove the GPIO interface, and restore the switches to their original settings. Remove the test hood and reconnect your peripheral device.

GPIO Test Output

The output for a GPIO test set to loop forever is shown below. The first two lines identify the interface by name and select code. The next four lines further identify the interface, giving interrupt level, and jumper and switch settings. The following lines show that each pass of the exercise was completed without errors until the exercise was stopped by pressing the **Exit** softkey .

```

If switches are incorrect - Errors may occur!

98622A GPIO Card Exerciser
Select Code 12
Interrupt Level 3
The BURST Jumper is Installed
The CLEAR DATA OUT Jumper is Not Installed
See 98622A installation manual for details.

Completed Pass 1
Completed Pass 2
Completed Pass 3
Completed Pass 4
Completed Pass 5
Exercise stopped by user

```

GPIO Test Errors

If the test terminates with an error condition, the following message will appear on the error-logging device:

```
Bad 98622A Card
```

This is commonly followed by instructions to check the switch settings and test hood. Run through the test again, making sure the switches are set correctly and the test hood is snugly in place. If the error is repeated, call your service representative for assistance.

HP 98623A BCD Interface Test

The test allows you to check the operation of an HP 98623A BCD interface card. The instructions below provide an abbreviated procedure for setting up and running the exerciser; for more detailed instructions, refer to the General Instructions at the beginning of this chapter.

Procedure Review

At this point in the software, you have performed the following tasks:

1. Set the switches on the BCD card according to directions in Chapter 2.
2. Loaded the System Tests from the program discs.
3. Pressed the **I/O Tests** softkey in the Test Selection Display.
4. Selected your error-logging device.
5. Selected BCD from the interface menu.
6. Answered the test hood prompt with **Yes** if you want testing to be done.
7. Selected the number of test passes.
8. Reviewed the test specifications summary.

Before You Continue

- Disconnect all devices from the BCD interface.
- Connect the BCD test hood to the socket on the interface card.

Start the Test

Now press **Start** to begin the test.

After the test is finished, turn your computer off, remove the BCD interface, and restore the switches to their original settings. Remove the test hood, and reconnect your peripheral device.

BCD Test Output

The output for a single pass of a BCD test is shown below. The first three lines identify the interface by name and select code. The next four lines give further identify the interface, giving interrupt level and switch settings. The following lines show that this pass of the exercise was completed without errors.

```

98623A BCD Card Exerciser
 1 Passes requested
Select Code 11
Interrupt Level 3
U24 Switches set to (OF?) 01010 (OVLD)
See 98623A instalation manual for details.

Completed Pass 1
Exercise Completed

```

BCD Test Errors

If the test terminates with an error condition, the following message will appear on the error-logging device:

```
Bad 98623A Card
```

This is commonly followed by instructions to check the switch settings and test hood. Run through the test again, making sure the switches are set correctly and the test hood is snugly in place. If the error is repeated, call your service representative for assistance.

HP 98624A HP-IB Interface Test

The test allows you to check the operation of a plug-in HP-IB interface. The instructions below provide an abbreviated procedure for setting up and running the exerciser; for more detailed instructions, refer to the General Instructions at the beginning of this chapter.

Procedure Review

At this point in the software, you have performed the following tasks:

1. Configured the HP-IB interface(s) involved in the test according to directions in Chapter 2.
2. Loaded the System Tests from the program discs.
3. Pressed the **I/O Tests** softkey k1 in the Test Selection Display.
4. Selected your error-logging device.
5. Selected HP-IB from the interface menu.
6. Selected the second HP-IB interface to check data transfer, if desired.
7. Selected the number of test passes.
8. Reviewed the test specifications summary.

Before You Continue

- Disconnect all devices from the HP-IB interface(s) involved in the test.
- If you are running a data transfer test (i.e., you have selected a second interface to check data transfer), connect the HP-IBs together with an HP-IB cable. This allows data leaving the plug-in HP-IB to be routed directly back into the computer through the second HP-IB. If the output data matches the input data, then transmission of data through the plug-in HP-IB is proceeding normally.
- If you are **not** running a data transfer test (i.e., you did not select a second HP-IB to check data transfer), **do not** connect the HP-IB under test to any other interface or peripheral. Otherwise, erroneous test results may be reported.

Start the Test

Now press the **Start** softkey k0 to begin the test.

After the test, restore all interfaces to their original system controller and select code settings. Reconnect your peripheral devices.

Plug-in HP-IB Test Output

The output for a single pass of a plug-in HP-IB test is shown below. The first three lines give the interface type and select code. The next three lines give identifying information about the interface, including interrupt level and switch settings. The following lines show that this pass of the exercise was completed without errors.

```
98624A Card HP-IB Exerciser
 1 passes requested
Select code 8
HP-IB Address 20
Set to System Controller
Interrupt Level 3
Completed Pass 1
Exerciser Completed
```

Plug-in HP-IB Test Errors

If the test terminates with an error condition, the following message will appear on the error-logging device:

```
Bad 98624A Card
```

This message may include a review of the correct card configuration(s) or report that an error has occurred. Check that the HP-IB card(s) are configured correctly and run the test again. If the error is repeated, call your service representative for assistance.

HP 98625A Disc Interface Test

The test allows you to check the operation of an HP 98625A Disc interface card. The instructions below provide an abbreviated procedure for setting up and running the exerciser; for more detailed instructions, refer to the General Instructions at the beginning of this chapter.

Procedure Review

At this point in the software, you have performed the following tasks:

1. Configured the Disc and internal HP-IB interfaces, and the DMA card as described in Chapter 2.
2. Loaded the System Tests from the program discs.
3. Pressed the **I/O Tests** softkey in the Test Selection Display.
4. Selected your error-logging device.
5. Selected **DISC INTFC** from the interface menu.
6. Selected the number of test passes.
7. Reviewed the test specifications summary.

Before You Continue

- Disconnect all devices from the Disc interface.
- Connect one end of an HP-IB cable to the Disc Interface card and the other end to the internal HP-IB socket. The HP-IB cable routes data passing out through the disc interface back into the computer through the HP-IB interface. If the data sent out matches the data received, data transfer is proceeding normally.

Start the Test

Now press the **Start** softkey to begin the test.

A message now appears on the screen reminding you of the proper configuration for the test. Review this information, then press the **Continue** softkey to proceed with the test.

After the test, restore all interfaces to their original system controller and select code settings. Reconnect your peripheral devices.

Disc Interface Test Output

The output for a single pass of a Disc Interface test is shown below. The first three lines give the interface type and select code. The following lines show that this pass of the exercise was completed without errors.

```
98625A Disc Interface Card
 1 Passes requested
Select Code 14
Completed Pass 1
Tests ran 1 time
```

Disc Interface Test Errors

If the test terminates with an error condition, the following message will appear on the error-logging device:

```
Bad 98625A Card
```

This message may include a list of possible sources of error. Make any recommended corrections and run the test again. If the error is repeated, call your service representative for assistance.

HP 98626A RS-232 Interface Test

The test allows you to check the operation of an HP 98626A RS-232 interface card. The instructions below provide an abbreviated procedure for setting up and running the exerciser, for more detailed instructions, refer to the General Instructions at the beginning of this chapter.

Procedure Review

At this point in the software, you have performed the following tasks:

1. Loaded the System Tests from the program discs.
2. Pressed the **I/O Tests** softkey in the Test Selection Display.
3. Selected your error-logging device.
4. Selected RS-232 from the interface menu.
5. Answered the test hood prompt with the **Yes** softkey if you want data transfer testing to be done.
6. Selected the number of test passes.
7. Reviewed the test specifications summary.

Before You Continue


- Disconnect all devices from the RS-232 interface.
- If using an RS-232 test hood, connect it to the socket on the interface card.

Start the Test

Now press **Start** to begin the test.

After the test is finished, remove the test hood and reconnect your peripheral devices.

RS-232 Interface Test Output

The output for an RS-232 test set to loop forever is shown below. The first two lines give the interface type and select code. The next six lines give identifying information about the interface, including interrupt level, and jumper and switch settings. The following lines show that each pass of the exercise was completed without errors until stopped by the user with the **Exit** softkey, .

```
98626A RS-232 Card Exerciser
Select Code  9
Interrupt Level  4
Jumper is installed at REMOTE
U1 switches are set to 1010  ( 2400 baud )
U2 switches are set to 00000011
U3 switches are set to 0000  (0 - CONNECT)
See 98626A installation manual for details.

Completed Pass  1
Completed Pass  2
Completed Pass  3
Completed Pass  4
Completed Pass  5
Exercise stopped by user
```

RS-232 Interface Test Errors

If the test terminates with an error condition, the following message will appear on the error-logging device:

```
Bad 98626A Card
```

This message may include a list of possible sources of error. Make any recommended corrections and run the test again. If the error is repeated, call your service representative for assistance.

HP 98627A Color Output Interface Test

The test allows you to check the operation of an HP 98627A Color Output interface card. The instructions below provide an abbreviated procedure for setting up and running the exerciser; for more detailed instructions, refer to the General Instructions at the beginning of this chapter.

Procedure Review

At this point in the software, you have performed the following tasks:

1. Loaded the System Tests from the program discs.
2. Pressed the **I/O Tests** softkey in the Test Selection Display.
3. Selected your error-logging device.
4. Selected **COLOR** from the interface menu.
5. Selected the number of test passes.
6. Reviewed the test specifications summary.

Before You Continue

The Color Output interface test does not require a color monitor. If used, however, the monitor will display several patterns that allow you to visually check color output. Be sure that the interface option switches are set correctly for the type of monitor you are using. See your Color Output Interface Installation manual for more information.

Note

This test takes approximately 45 minutes to run.

Start the Test

Now press **Start** to begin the test.

The program now prompts for the type of timing used by your color monitor. If you are not using a monitor, press any softkey to proceed with the test. Otherwise, press:

- if you are using a United States Standard monitor
- if you are using a European Standard monitor
- if you are using a High Resolution monitor
- if you are using a United States TV monitor
- if you are using a European TV monitor

Color Output Interface Test Output

Normal test output is directed to a color monitor if one is used. A color bar pattern is displayed first, then a variety of patterns will appear as a memory test of each plane is performed. A pass completed message will be printed if the test terminates without error.

Color Output Interface Test Errors

If the test terminates with an error condition, the following message will appear on the error-logging device:

```
Bad 98627A Card
```

This message may include a list of possible sources of error. Make any recommended corrections and run the test again. If the error is repeated, call your service representative for assistance.

If your color monitor displays abnormal test patterns, either the monitor or the interface may be at fault. Try to correct the problem by adjusting the monitor. If the problem persists, call for service.

HP 98628A and 98691A Datacomm Interface Test

The test allows you to check the operation of the HP 98628A Asynchronous Datacomm and HP 98691A Programmable Datacomm interface cards. The instructions below provide an abbreviated procedure for setting up and running the exerciser; for more detailed instructions, refer to the General Instructions at the beginning of this chapter.

Procedure Review

At this point in the software, you have performed the following tasks:

1. Loaded the System Tests from the program discs.
2. Pressed the **I/O Tests** softkey k1 in the Test Selection Display.
3. Selected your error-logging device.
4. Selected **DATACOMM** from the interface menu, making sure to choose the select code of the Datacomm interface you want to test.
5. Selected the number of test passes.
6. Reviewed the test specifications summary.

Before you Continue


Disconnect all devices from your Datacomm interface.

Start the Test

Now press the **Start** softkey k0.

After the test is finished, reconnect your peripheral devices.

Datacomm Interface Test Output

The output for a 98628A Datacomm test set to loop forever is shown below. The first three lines give the interface type and select code. The next four lines give identifying information about the interface, including interrupt level and switch settings. These lines should uniquely distinguish the card you are testing from any other Datacomm cards you may have installed in your computer. The final lines show that each pass of the exercise was completed without errors until stopped by the user with the **Exit** softkey, .

```
Datacomm Card Exerciser
Select Code 20
98628A Asynchronous Datacomm
Interrupt Level 3
Remote switch is Not Set
Switch 1 set to 10010100
See Installation manual for details

Completed Pass 1
Completed Pass 2
Exercise stopped by user
```

Datacomm Interface Test Errors

If the test terminates with an error condition, the following message will appear on the error-logging device:

```
Bad 98628A Card
```

This message may include a list of possible sources of error. Make any recommended corrections and run the test again. If the error is repeated, call your service representative for assistance.

This exerciser will not detect data transfer errors. If the test is passed but you still suspect a problem, call for service.

HP 98629A SRM Interface Test

The test allows you to check the operation of an HP 98629A SRM (Resource Management) interface card. The instructions below provide an abbreviated procedure for setting up and running the exerciser; for more detailed instructions, refer to the General Instructions at the beginning of this chapter.

Procedure Review

At this point in the software, you have performed the following tasks:

1. Loaded the System Tests from the program discs.
2. Pressed the **I/O Tests** softkey in the Test Selection Display.
3. Selected your error-logging device.
4. Selected DATACOMM from the interface menu, making sure to choose the select code of the Datacomm interface you want to test.
5. Selected the number of test passes.
6. Reviewed the test specifications summary.

Before you Continue

Disconnect all devices and cables from your SRM interface. Otherwise, your Shared Resource Manager may be rendered unoperational by the test.

Start the Test

Now press the **Start** softkey .

After the test is finished, reconnect your peripheral devices.

SRM Interface Test Output

The output for an SRM interface test set to loop forever is shown below. The first three lines give the interface type and select code. The next four lines give identifying information about the interface, including interrupt level and switch settings. Switch 1 shows the binary representation of the node address. These lines should uniquely distinguish the card you are testing from any other Datacomm cards you may have installed in your computer. The final lines show that each pass of the exercise was completed without errors until stopped by the user with the **Exit** softkey, .

```
Datacomm Card Exerciser
Select Code 21
98629A Shared Resource Management
Interrupt Level 4
Remote Switch is Not Set
Switch 1 set to 00010100
See Installation manual for details.
```

```
Completed Pass 1
Completed Pass 2
Completed Pass 3
Completed Pass 4
Completed Pass 5
Exercise stopped by user
```

SRM Interface Test Errors

If the test terminates with an error condition, the following message will appear on the error-logging device:

Bad 98629A Card

This message may include a list of possible sources of error. Make any recommended corrections and run the test again. If the error is repeated, call your service representative for assistance.


This exerciser will not detect data transfer errors. If the test is passed but you still suspect a problem, call for service.

Internal HP-IB Interface Test

The test allows you to check the operation of an internal HP-IB Interface. The instructions below provide an abbreviated procedure for setting up and running the exerciser; for more detailed instructions, refer to the General Instructions at the beginning of this chapter.

Procedure Review


At this point in the software, you have performed the following tasks:

1. Configured the HP-IB interface(s) involved in the test according to directions in Chapter 2.
2. Loaded the System Tests from the program discs.
3. Pressed the **I/O Tests** softkey  in the Test Selection Display.
4. Selected your error-logging device.
5. Selected 7 HP-IB from the interface menu.
6. Selected the second HP-IB interface to check data transfer, if desired.
7. Selected the number of test passes.
8. Reviewed the test specifications summary.

Before You Continue


- Disconnect all devices from the HP-IB interface(s) involved in the test.
- If you are running a data transfer test (i.e., you have selected a second interface to check data transfer), connect the HP-IBs together with an HP-IB cable. This allows data leaving the internal HP-IB to be routed directly back into the computer through the second HP-IB. If the output data matches the input data, then transmission of data through the internal HP-IB is proceeding normally.
- If you are **not** running a data transfer test (i.e., you did not select a second HP-IB to check data transfer), **do not** connect the internal HP-IB to any other interface or peripheral. Otherwise, erroneous test results may be reported.

Start the Test

Now press the **Start** softkey  to begin the test.

After the test, restore all interfaces to their original system controller and select code settings. Reconnect your peripheral devices.

Internal HP-IB Test Output

The output for an Internal HP-IB test set to loop forever is shown below. The first two lines give the interface type and select code. The next three lines give identifying information about the interface, including interrupt level, and jumper and switch settings. The following lines show that each pass of the exercise was completed without errors until stopped by the user with the **Exit** softkey, .

```
Internal HP-IB Exerciser
Select Code 7
HP-IB Address 21
Set to System Controller
Interrupt Level 3

Completed Pass 1
Completed Pass 2
Completed Pass 3
Completed Pass 4
Exercise stopped by user
```

Test Errors

If the test terminates with an error condition, the following message will appear on the error-logging device:

```
Bad HP-IB Card
```

This message may review the proper card configuration(s) or report that an error occurred. Check that the HP-IB card(s) are configured correctly and run the test again. If the error is repeated, call your service representative for assistance.

HP 98620A DMA Card

While there is no selectable exerciser for the DMA card, it is automatically tested whenever a Disc, GPIO or HP-IB interface test is run. The interface must be configured to permit a data transfer test.

Data can pass through a DMA card in 8-bit or 16-bit groups. When testing an HP-IB or Disc interface, 8-bit DMA transfers are performed. 16-bit DMA transfers are performed when testing a GPIO interface.

Note

The DMA card will not be tested during a GPIO test unless the Burst jumper is removed.

DMA Test Errors

If a DMA card error is reported, run the test a second time. If the error recurs, call your service representative for assistance.

Chapter 6

Mainframe Tests

The Series 200 Mainframe Tests software detects and reports hardware failures in Series 200 mainframes. This chapter explains how to run the mainframe tests and lists the error messages which may appear. It also explains how to clear some error conditions.

When to Run the Mainframe Tests

You should run the mainframe tests any time you are encountering problems with the system and either the symptoms indicate the mainframe or you have isolated the problem to the mainframe. For instance, if none of the interfaces will operate properly, the problem probably does not lie with any of the interfaces, but rather with the mainframe. As another example, suppose you have problems with a peripheral and run the diagnostic tests appropriate for that peripheral and interface. The results are inconclusive (that is, the tests will not run or provide meaningless results) but replacing the peripheral and interface result in the same problems. The mainframe is probably defective rather than the peripheral or interface. Removing the interface and running the mainframe tests will quickly determine where the problem lies.

How to Run the Mainframe Tests

The mainframe tests software is contained on disc 1. It consists of 15 individual tests which diagnose specific areas of the computer. The 15 tests are grouped in two arrangements, the System Test Procedure and the Individual Test Mode. The System Test Procedure consists of the 10 most important tests set up to run automatically upon loading. The Individual Test Mode is a method by which all 15 tests can be accessed, either individually or in any combination.

System Test Procedure

The System Test Procedure runs tests on many portions of the computer and produces error and status messages on the CRT and internal HP-IB. It also produces patterns for checking the CRT display.

It starts automatically when the Computer Tests are selected from the Test Selection Display.

System Test Sequence

The system test consists of a sequence of tests which check individual sections of the computer. The names of the tests are as follows:

- Processor test
- ROM checksum test
- RAM pattern test
- I/O configuration test
- CRT character test
- Keyboard test
- Disc drive test
- CRT graphics test
- Powerfail test (if installed)
- Serial interface test

This test sequence runs continuously until it is terminated by the operator or it stalls due to a defective assembly.

While the test sequence is running, it generates status and error messages and test patterns which are displayed on the CRT. If you suspect the CRT is defective, refer to the section on External Error Logging.

Running the System Test Procedure

Use the following procedure to run the System Test Procedure. See Figure 6-1 for a flowchart of this procedure.

1. Turn the computer off.
2. Insert System Tests Disc 1 into the default flexible disc drive and close the door.
3. Turn the computer on. You should hear the drive click as it loads the program. If it does not load, press reset. If it still does not load, refer the computer to service.
4. When the Test Selection Display appears on the screen, press the **Computer Tests** softkey, either or . Select your error-logging device, and print instructions for the computer tests, if desired. The System Test Procedure will then start automatically. No operator action is needed.
5. If a test routine produces error messages, go to the section of the Individual Test Mode which covers that portion of the computer. Some problems may be cleared by the operator.
6. If the System Test Procedure produces status messages but not error messages, it is unable to detect any problems with the unit.
7. If neither status messages nor error messages are produced, refer the computer to service, as the CRT is defective.

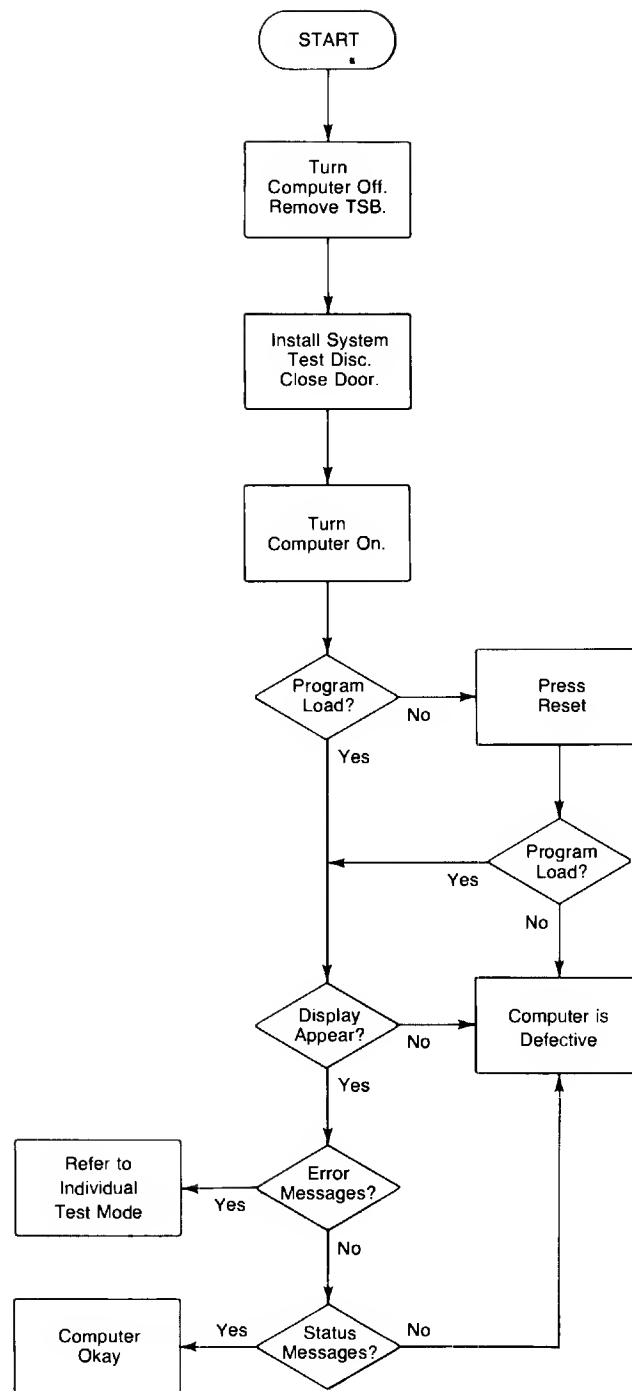


Figure 6-1. System Test Procedure Flowchart

Individual Test Mode

Individual test mode consists of 15 tests, the 10 in the System Test Procedure plus five others too lengthy or unimportant to be included.

The Individual Test Mode is entered from the System Test Procedure by pressing the RESET (SHIFT PAUSE) key. This menu will appear on the display:

```

00 -> PROCESSOR TEST      20    POWER FAIL TEST
01    ROM TEST            21    EXTENDED ROM TEST
02    RAM TEST            22    SPECIAL RAM TEST
03    CRT ALPHA TEST      23    60Hz CRT PATTERN
04    KEYBOARD TEST       24    50Hz CRT PATTERN
05    FLOPPY DISC TEST    25    (unused)
06    EXTENDED RAM TEST   26    I/O CONFIGURATION
07    CRT GRAPHICS TEST   27    (unused)
08    EXTENDED GRAPHICS   28    RS-232 TEST
09    DISC DIAGNOSTIC     29    (unused)
10    (unused)            30    (unused)
11    (unused)            31    (unused)
12    (unused)            32    (unused)
13    (unused)            33    (unused)
14    COMMAND FILE        34    (unused)
15    HP-IB LOG TOGGLE    35    (unused)
16    TURN-ON MODE        36    (unused)
17    EXIT (re-boot)      37    (unused)
18    EXECUTE ONCE        38    (unused)
19    LOOP FOREVER        39    (unused)

```

Use the KNOB to select then ENTER. To run
once hit EXECUTE. To cancel use RESET (Shift,
PAUSE).
TEST MODE

The individual tests may be selected in two ways. The first method uses the knob to position the arrow to the test you want to run. When the arrow points to the desired test, press **ENTER**. After you have selected the test(s) you want to run, press **EXECUTE**. With the alternate method, press the appropriate key or combination of keys, as indicated by the number associated with the desired test. The number is decoded as follows:

| | Small Keyboard | Large Keyboard |
|---------|-----------------------------------|---|
| K0-K9 | 0-9 key | softkey k0-k9 |
| K10-K19 | SHIFT key and 0-9 key | SHIFT key and softkey k0-k9 |
| K20-K29 | CONTROL key and 0-9 key | CONTROL key and softkey k0-k9 |
| K30-K39 | SHIFT key, CONTROL key 0-9 key | SHIFT key, CONTROL key and softkey k0-k9 |

A small keyboard is one with five or fewer softkeys and a large keyboard is one with 10 or more.

Refer to the individual sections in this chapter for a description of each test listed above. The 10 tests in the System Test Procedure are identical to the above tests with the same name.

In addition to the individual tests, there are some special functions obtained by using the SHIFT and CONTROL keys in conjunction with the softkeys or number keys. These definitions are as follows:

k15 (SHIFT k5). Toggles the HP-IB error log function. If no printer is present at the selected address, a LOG OFF message is displayed on the CRT. Refer to the section on error logging in the System Test Procedure.

k16 (SHIFT k6). Causes the diagnostic procedure to exit from test mode and return to the System Test Procedure.

k17 (SHIFT k7). Causes the diagnostic procedure to exit from Test Mode and branch to the boot ROMs. This will allow any operating system installed to begin executing. If the Mainframe Tests disc is installed, it will start over with the first test.

k18 (SHIFT k8). Executes the selected test sequence once.

k19 (SHIFT k9). Executes the selected test sequence continuously.

k39 (SHIFT CONTROL k9). Provides the operator a method for sending a message to the error reporting device (CRT or external printer). The operator presses k18 for one line of text, or k19 for several lines, then enters a line of text and presses the CONTINUE key after each line.

These softkey definitions provide a means of selecting a test or sequence of tests which would assist the user in the diagnostic process. An example of how to use these softkey definitions might be the following:

k3 CRT character test

k7 CRT graphics test

k8 Extended CRT graphics test

k19 Execute the above sequence continuously

This “program” will continuously execute the three CRT tests. A pass count is displayed on the CRT after each pass.

The “program” can be aborted by using RESET (SHIFT PAUSE).

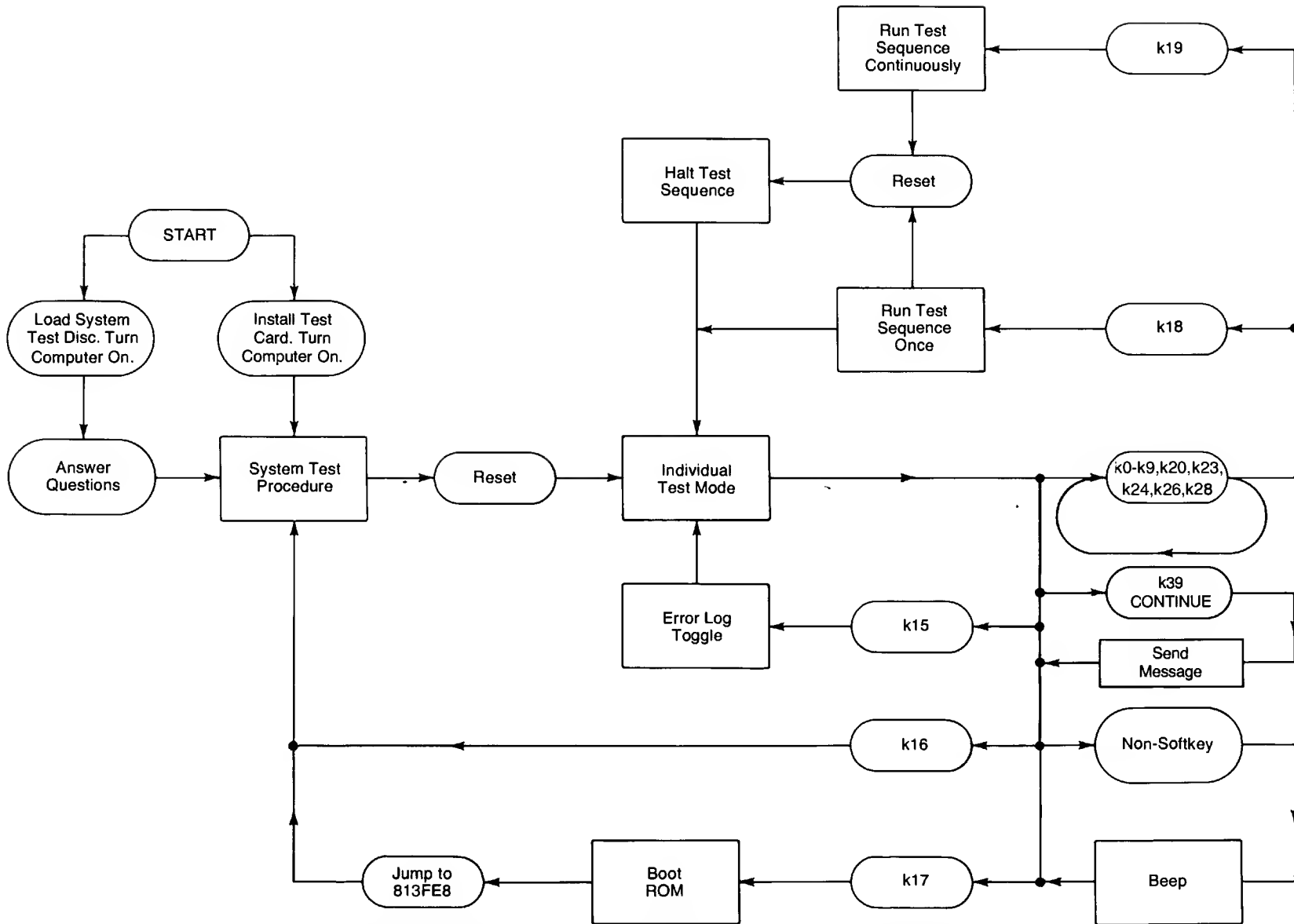


Figure 6-2. Individual Test Mode Softkey Assignment Flowchart

Processor Test (k0)

The processor test is the first test run in the System Test Procedure. No message appears on the CRT. It takes less than a second to complete.

The processor test exercises each 68000 instruction at least once. It checks all of the effective addressing modes with a selected set of instructions. The TRAP and exception processing are tested. Both ROM and RAM memory references are made in this test.

If the processor test fails, the following message may appear on the CRT:

NO RAM @ FF

If this message appears, refer to the section on RAM memory tests.

The processor test may stall. If it does, refer the computer to service.

ROM Memory Test (k1)

The ROM test is included in the System Test Procedure. No CRT message is displayed until the conclusion of the test. The ROM test takes less than one second to complete.

The ROM test performs a checksum on all ROMs present in the computer. This includes option ROMs, language ROMs, the boot ROMs and the test card ROMs. Checking is done on a byte addressing basis because the data in the upper and lower bytes are not in the same ROM part. Data is added to form a checksum. The test fails if the checksum is not FFFF.

There are two types of Language ROM boards, one which holds 128k bytes of ROM and one which holds 512k bytes of ROM. The two boards are similar in appearance, but can be differentiated using information presented in this section.

When the ROM test is finished, the CRT displays the message

ROM @ 08Kb: XXXXXX 16Kb: XXXXXX, 64Kb: XXXXXX

which is a memory map of the ROMs present in the computer. 08Kb, 16Kb and 64Kb refer to the size of the individual ROM chips, and one address is presented for each PAIR of ROM ICs in the computer. The 128k byte ROM board is composed of 16k byte ROMs and the 512k byte ROM board is composed of 64k byte ROMs. Note that ROM may be present at locations other than language ROM boards.

If the ROM test fails, any of the following messages may appear on the CRT:

ROM @ XXXXXX REVERSED

ROM CHECKS XXXX @
YYYYYY

ROM ADDR had XXXXXX
@ YYYYYY

ROM # has XXXX
not YYYY @ ZZZZZZ

ROM L = “ “ @ XXXXXX

UNABLE TO DRIVE

UNABLE TO REMOVE DRIVE

CPU BOARD SIZE ERROR YY

CPU BOARD PROM CHK_SUM YYYY @ 5F0001

CPU BOARD SIZE YY00 @ 5F0001

Refer the computer to service if you obtain any of these error messages.

If the test disc is unable to detect the presence of a ROM, no error message is generated. Therefore, if you suspect a problem with ROM, particularly a language board, check that there is an entry in the ROM map for each ROM pair at a particular address. This can be done by physically counting the ROMs on a language board and comparing them to the addresses listed in the ROM map.

ROM Addressing

The various ROM locations in the computer are addressed by a six digit hexadecimal number. The boot ROM is located between 000000 and 003FFF. Language and option ROMs are located between 020000 and 3FFFFFFF.

Option ROM Board Addressing

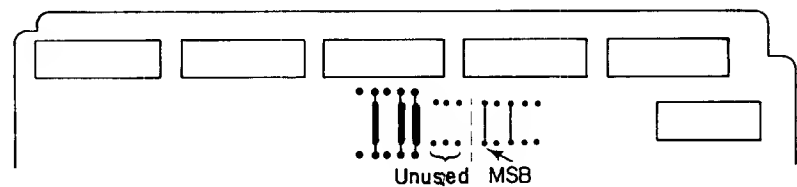
The memory space between the boot ROM and address 400000 is dedicated to language and option ROM. This space is arranged in blocks of 128k bytes. For the sake of simplicity, the boot ROM is allotted a 128k byte block, although it is only 16k bytes in size. Since 128k bytes is 20000 in hexadecimal, there is room for 31 blocks, with the first block addressed from 020000 to 03FFFF (000000 to 01FFFF are allotted to the boot ROM) and succeeding blocks starting with multiples of 20000.

Each 128k byte ROM board contains one block. Each 512k Byte ROM board contains four consecutive blocks, with the number of the first block being a multiple of four.

Checking an Option ROM Board Address

128k Byte ROM Board.A five segment jumper location determines which of the 31 blocks a given board represents. The jumper location is a binary representation of the block number. A jumper present represents a zero and a jumper absent represents a one.

For instance, a ROM board has jumpers installed like this:



The jumpers read 01011. 01011 in binary converts to 0B in hexadecimal.

To determine the ROM address space occupied by a 128k byte board, multiply the block number by 20000 (hexadecimal). For instance, in the above example, B multiplied by 20000 is 160000. Therefore, this ROM board starts with address 160000 and ends with 17FFFF (one block).

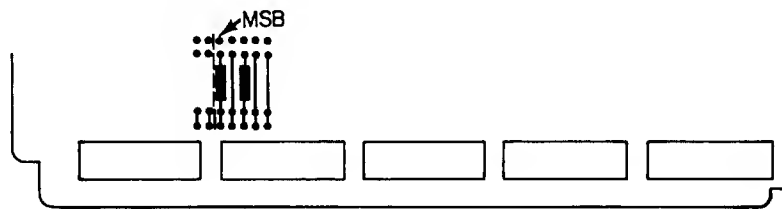
An alternative to hexadecimal multiplication is to locate the jumper arrangement in this chart:

| 512k Byte Board Jumpers | 128k Byte Board Jumpers | Block | Starting Address | Ending Address |
|-------------------------|-------------------------|-------|------------------|----------------|
| | 00001 | 1 | 020000 | 03FFFF |
| | 00010 | 2 | 040000 | 05FFFF |
| | 00011 | 3 | 060000 | 07FFFF |
| 00100 | 00100 | 4 | 080000 | 09FFFF |
| | 00101 | 5 | 0A0000 | 0BFFFF |
| | 00110 | 6 | 0C0000 | 0DFFFF |
| | 00111 | 7 | 0E0000 | 0FFFFF |
| 01000 | 01000 | 8 | 100000 | 11FFFF |
| | 01001 | 9 | 120000 | 13FFFF |
| | 01010 | A | 140000 | 15FFFF |
| | 01011 | B | 160000 | 17FFFF |
| 01100 | 01100 | C | 180000 | 19FFFF |
| | 01101 | D | 1A0000 | 1BFFFF |
| | 01110 | E | 1C0000 | 1DFFFF |
| | 01111 | F | 1E0000 | 1FFFFF |
| 10000 | 10000 | 10 | 200000 | 21FFFF |
| | 10001 | 11 | 220000 | 23FFFF |
| | 10010 | 12 | 240000 | 25FFFF |
| | 10011 | 13 | 260000 | 27FFFF |
| 10100 | 10100 | 14 | 280000 | 29FFFF |
| | 10101 | 15 | 2A0000 | 2BFFFF |
| | 10110 | 16 | 2C0000 | 2DFFFF |
| | 10111 | 17 | 2E0000 | 2FFFFF |
| 11000 | 11000 | 18 | 300000 | 31FFFF |
| | 11001 | 19 | 320000 | 33FFFF |

| | | | | |
|-------|-------|----|--------|---------|
| | 11010 | 1A | 340000 | 35FFFF |
| | 11011 | 1B | 360000 | 37FFFF |
| 11100 | 11100 | 1C | 380000 | 39FFFF |
| | 11101 | 1D | 3A0000 | 3BFFFF |
| | 11110 | 1E | 3C0000 | 3DFFFF |
| | 11111 | 1F | 3E0000 | 3FFFFFF |

512k Byte ROM Board. A five segment jumper/pull-up resistor location determines which four of the 31 blocks a given board represents. The jumper/resistor location is a binary representation of the number of the lowest address block. A jumper represents a zero and a pull-up resistor represents a one.

For instance, a ROM board has jumpers installed like this:



The segment location reads 10100. 10100 in binary converts to 14 in hexadecimal.

To determine the ROM address space occupied by a 512k byte board, multiply the block number by 20000 (hexadecimal). For instance, in the above example, 14 multiplied by 20000 is 280000. Therefore, this ROM board starts with address 280000 and ends with 2FFFFFF (four consecutive blocks).

An alternative to hexadecimal multiplication is to locate the jumper/resistor arrangement in the chart on the previous page.

Locating a Defective ROM

The ROM tests have error messages containing addresses of the form MNPQRS, where MNPQRS is a hexadecimal number. MNPQRS is generally the first location in a ROM IC, therefore it is usually of the form MNP000 or MNP001. An example might be:

ROM CHECKS 1B4F @ 2D4001

If the address is 000XXX, the error message refers to the boot ROM.

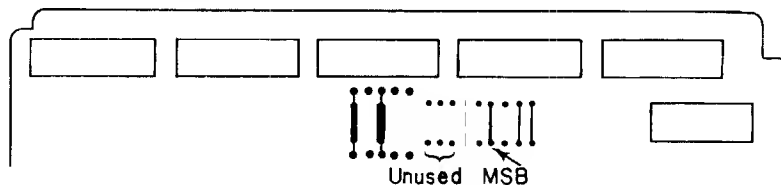
If the address lies between 020000 and 3FFFFFF, the message refers to a language or option ROM located on an option ROM board. The defective board is located using the procedure in the next paragraph.

Locating a Defective Option ROM Board

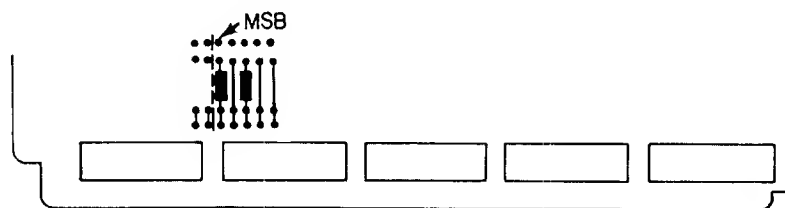
A defective option ROM board is located by reversing the procedure presented in the section on Checking a ROM Board Address. Divide the address MNPQRS by 20000, ignoring any remainder. Convert the resulting hexadecimal number into binary, and find a ROM board with jumpers matching the binary number. For instance, the message

ROM CHECKS 1B4F @ 294001

appears on the CRT. 294001 divided by 20000 is 14 with a remainder of 14001. 14 in hexadecimal is 10100 in binary. Find a ROM board with jumpers matching this number. A 128k byte ROM board will look like this:



A 512k byte ROM board will look like this:



An alternative to hexadecimal division is to locate the address in the chart on the previous page.

RAM Memory Test (k2)

The RAM pattern test is included in the system test procedure. It checks all system RAM in the computer; that is, all RAM not dedicated to a specific purpose, such as the display. It takes about 25 seconds to complete, depending on the number of RAM boards installed. This test will isolate many common hard errors, such as stuck RAM bits, addressing and refresh problems. If you suspect you are having RAM problems even though this test passes, run the extended RAM test.

The RAM Pattern test exercises all system RAM present in the computer with a series of patterns. These patterns are:

- 55AA (0101010110101010)
- AA55 (1010101001010101)
- sequential data for addressability

In addition, a dynamic RAM refresh is done. An addressability check is made using byte and word addressing modes.

When the RAM Pattern test is finished, the CRT displays the message

RAM @ 256Kb: XX0000, 64Kb: XX0000, CPUbd: XX0000

This message forms a memory map of the RAMs.

If the RAM pattern test fails, any of the following messages may appear on the CRT:

RAM @ XXXXXX had
YYYYYYYY not ZZZZZZZZ

RAM RFSH @ XXXXXX
had YYYYYYYY not
ZZZZZZZZ

RAM CNFIG @ XXXXXX

BUS ERROR @ XXXXXX

RELOCATE FAILURE @
XXXXXX

RAM SPEED YYYY @
XXXXXX (ZZZZ,WWWW)

NO RAM AT FF

NO RAM SPEED @
XXXXXX-KBD BAD?

Extended RAM Test (k6)

The extended RAM test is included in the Individual Test Mode, but not in the System Test Procedure. It is much more comprehensive than the RAM pattern test and is much more likely to catch intermittent errors and addressing problems.

The test runs all of the k2 RAM pattern test, then performs a test on all system RAM except for the RAM located on the test card. The test may be aborted by pressing RESET (SHIFT PAUSE) anytime except while testing the first 64k bytes of RAM. When the extended RAM test is finished, the CRT displays the message

```
RAM @ 256Kb: XX0000, 64Kb: XX0000, CPUbd: XX0000
```

This message forms a memory map of the RAMs.

If the extended RAM test fails, any of the following messages may appear on the CRT:

```
RAM @ XXXXXX had  
YYYYYYYY not ZZZZZZZZ
```

```
RAM RFSH @ XXXXXX  
had YYYYYYYY not  
ZZZZZZZZ
```

```
RAM CNFIG @ XXXXXX
```

```
BUS ERROR @ XXXXXX
```

```
RELOCATE FAILURE @  
XXXXXX
```

```
RAM SPEED YYYY @  
XXXXXX (ZZZZ,WWWW)
```

RAM Addressing

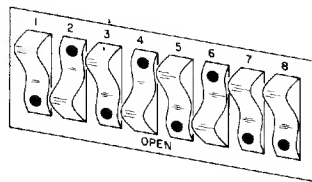
System RAM is addressed by a six digit hexadecimal number. It is arranged in blocks of 64k bytes at the top of memory, with the top address being FFFFFFFF. Since 64k is 10000 in hexadecimal, the top block includes addresses from FF0000 to FFFFFFFF. Each additional block covers the 64k below the preceding block. The RAM blocks must be contiguous.

One 64k block is located on the Processor/64k RAM board. Each optional 64k RAM board contains one block, and each optional 256k RAM board contains four blocks. The address block of the 64k and 256k RAM boards is switch-selected. The address block of the RAM on the Processor/64k RAM board is determined by the CPU to be the first unused address block.

Checking a RAM Board Address

RAM blocks cover addresses from MN0000 to MNFFFF, where M and N are hexadecimal numbers. This address block is determined by a switch on the RAM board.

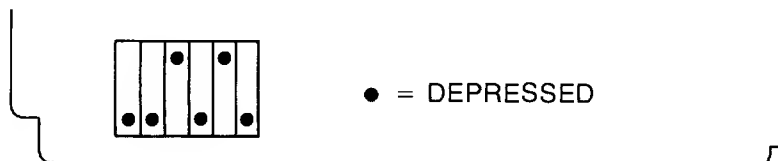
64k RAM Boards. An eight segment switch is used to determine the address block. Segments 8 through 5 determine the value of M and segments 4 through 1 determine the value of N. An open segment represents a 1 and a closed segment represents a 0. The binary number is read directly from the switch segments and converted to hexadecimal. For instance, this switch is set to 11010101:



| Binary | Hexadecimal |
|--------|-------------|
| 1101 | D |
| 0101 | 5 |

Thus, this RAM board covers the addresses from D50000 to D5FFFF.

256k RAM Boards. Since these boards contain four 64k blocks, only six segments are needed to determine the address. The left-most four segments of a six segment switch determine the value of M, and the other two segments (and two implied segments) determine the values of N. For instance, this switch is set to 110101:



| Binary | Hexadecimal |
|--------|-------------|
| 1101 | D |
| 01XX | 4, 5, 6, 7 |

Thus, this RAM board includes the addresses from D40000 to D7FFFF.

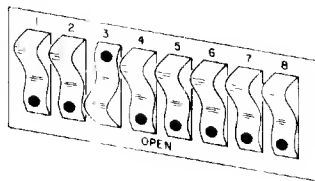
Locating a Defective RAM Board

The RAM tests have error messages containing addresses of the form MNPQRS (hexadecimal). The RAM board causing an error is easily found using the paragraph above on Checking a RAM Board Address. Any RAM address MNPQRS is located on the board containing the address block MN0000 to MNFFFF. Convert the MN digits into binary, then find a RAM board with switch settings which match the binary number.

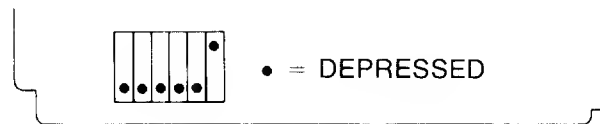
For instance, in the error message

RAM @ FB53A9 had F58A8C2C not F78A8C2C

the defective RAM is on a board with a starting address of FB0000. FB in binary is 11111011. Thus the switch setting of the defective board would be:



if a 64k RAM board, or:



if a 256k RAM board.

Locate the board with this switch setting.

Display Tests

CRT Character Test (k3)

The CRT character test is included in the System Test Procedure.

This test is designed for examining and adjusting the CRT. It places five patterns on the screen and holds them there for four seconds each. Pressing the PAUSE key holds the pattern until the CONTINUE key is pressed. Here is a description of the patterns used:

- full cell: a full screen of full cell characters
- focus: all rows, every other column of the symbol \mathfrak{h}
- grid (9826 only): a full screen of rectangles
- characters: all displayable characters arranged in rectangles
- scroll: the characters display scrolls up, then down

Included in this test is an extended test of the display RAM. It will cause the screen to flash for several seconds while the RAM is being checked.

If this test fails, any of these messages may be displayed on the CRT:

RAM @ 51XXXX had
YY not ZZ

RAM @ 51XXXX had
YYYY not ZZZZ

RAM HOLD @ 51XXXX
had YY not ZZ

RAM HOLD @ 51XXXX
had YYYY not ZZZZ

NO ALPHA IN KT

NO GRAPHICS IN KT

CRT Graphics Test (k7)

The CRT graphics test is included in the System Test Procedure. This test checks the graphics RAM using a bit isolation test, an addressability test and a refresh test. During the refresh test, the character display is turned on for viewing. A box, 400 dots wide and 300 dots high, is displayed (see Figure 6-3). This pattern has a diagonal line descending at a 45 degree angle from the top left corner to the bottom. This line passes through two characters. One is a full cell located in the upper left-hand corner. The other is located in the softkey area. The character display should align correctly with the graphics display (the diagonal line). Compare the display to Figure 6-3.

This test pattern will remain on the screen for four seconds. To keep the test pattern on the screen, press the PAUSE key. The test pattern will remain on the screen until the CONTINUE key is pressed.

If this test fails, any of the following messages may appear on the CRT:

NO GRAPHICS IN KT

RAM @ 53XXXX had

YYY not ZZZZ

RAM @ 53XXXX had

YY not ZZ

RAM RFSH @ 53XXXX had

YYYY not ZZZZ

RAM RFSH @ 53XXXX had

YYYYYYYYY not ZZZZZZZZ

COLOR MAP @ 53XXXX had

YYYY not ZZZZ

VERTICAL BLANK STUCK

HIGH

VERTICAL BLANK STUCK

LOW

VBLANK TIME YY (ZZ,WW)

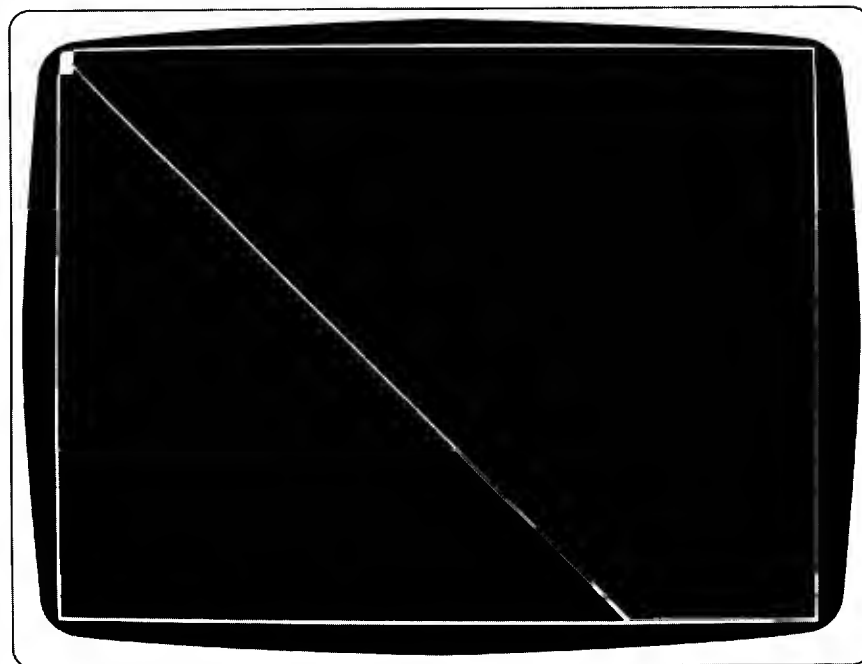


Figure 6-3A. 9826 CRT Graphics Test Pattern

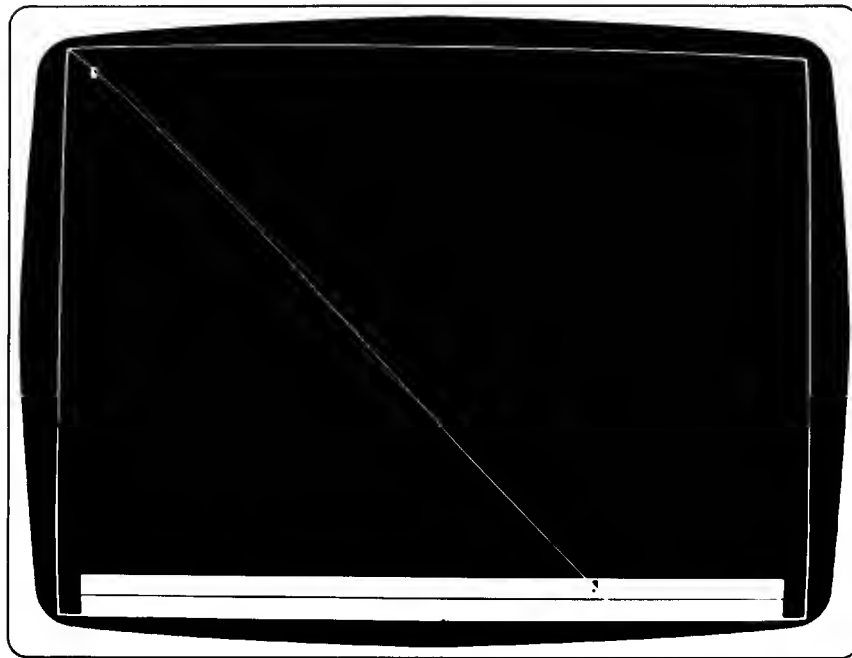


Figure 6-3B. 9836 CRT Graphics Test Pattern

CRT Alignment Test (k23)

The CRT alignment test is a convenient method for aligning the CRT. It consists of all of the CRT display patterns in the CRT character test and the CRT graphics test. It does not include a test of the display or graphics RAMs. Thus, the operator can run through the tests without waiting for lengthy RAM tests to execute. If running in a 9836, an extra alignment pattern is included (see Figure 6-4).

This test is selected by pressing the CONTROL key and the k3 softkey together. Each pattern remains on the screen for about four seconds. Pressing the PAUSE key keeps the pattern on the screen until the CONTINUE key is pressed.

This test produces no error messages, nor does it produce any pass/fail indications.

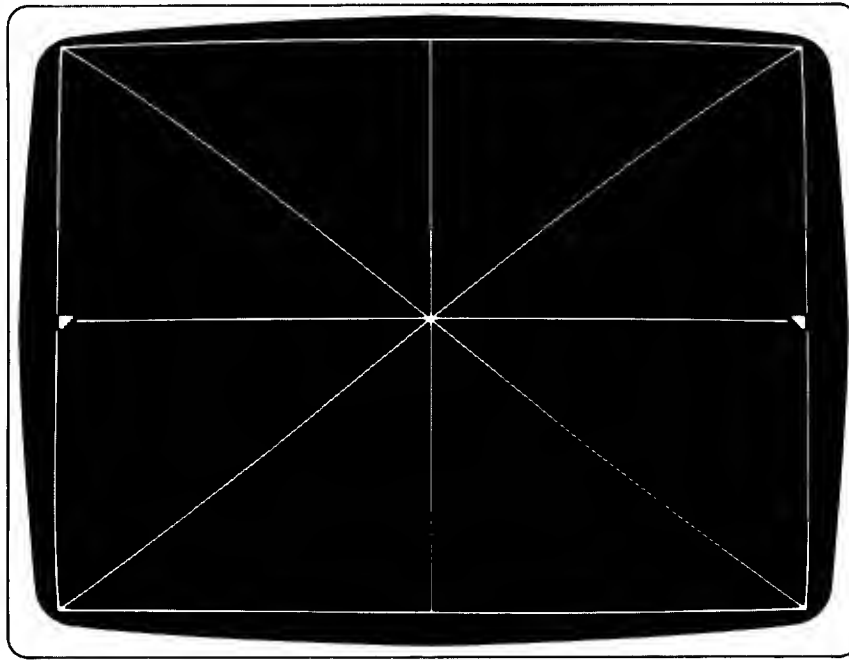


Figure 6-4. k23 Alignment Pattern

Extended CRT Graphics Test (k8)

The extended CRT graphics test is included in the Individual Test Mode but not in the System Test Procedure.

This test is much more comprehensive than the CRT graphics test and is much more likely to catch intermittent and addressing problems.

It takes about 100 seconds to complete.

The test runs the k7 CRT graphics test, then performs an extended test on the graphics RAM.

If this test fails, any of these messages may appear on the CRT:

NO GRAPHICS

RAM @ 53XXXX had
0000YYYY not 0000ZZZZ

RAM RFSH @ 53XXXX
had 0000YYYY not
0000ZZZZ

CRT Display Focus

The focus should be checked whenever a CRT assembly has been changed.

Display a full raster pattern of characters using k3, the CRT character test. The focus display was specifically chosen for focus. Adjust the focus control with the screwdriver end of a CRT tool to sharpen the appearance of the displayed characters.

It may not be possible to focus all areas of the display at a particular control setting; in this case, set the focus control at the point that gives the best overall appearance.

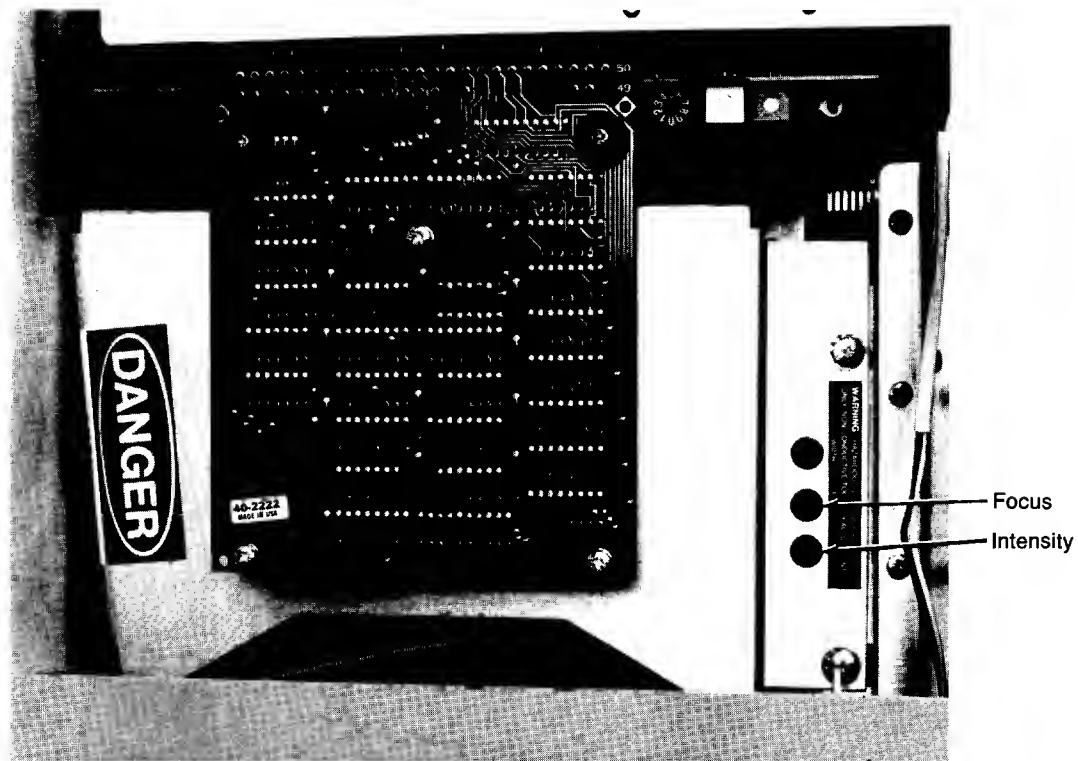


Figure 6-5A. 9826 CRT Intensity and Focus Adjustments.

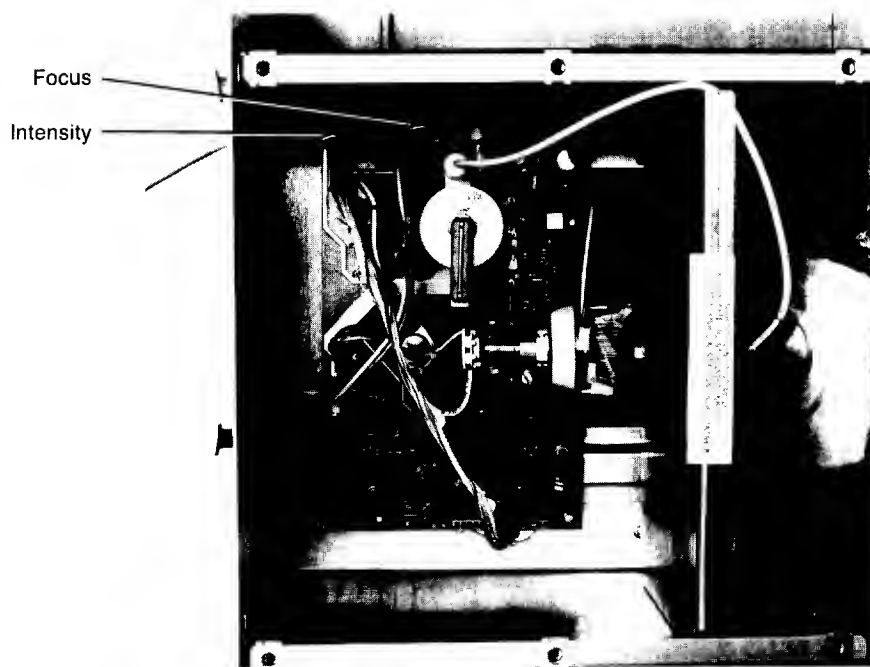


Figure 6-5B. 9836 CRT Intensity and Focus Adjustments.

CRT Intensity

To adjust the CRT intensity, follow this procedure:

1. Display a full screen of characters using k3, the CRT character test.
2. Turn the operator's intensity control all the way up.
3. Adjust the internal control with the screwdriver end of a CRT tool until the border area just disappears.
4. Adjust the operator's control for the desired intensity.

Keyboard Test (k4)

The keyboard test is included in the System Test Procedure.

This test checks whether the keyswitches are operating properly. It does this by displaying a diagram of the keyboard on the CRT (see Figure 6-6), and waiting five seconds for the user to press a key. Pressing a key changes the display of that key from an open box to an area of inverse video. Pressing the same key a second time returns the display to an open box. The keys may be pressed in any order desired. To check the CONTROL key or the two SHIFT keys, press each in combination with any other key. They will light on any keystroke where they are pressed with another key, and will go out as soon as a key is pressed without pressing the shift or control key. The rotary control knob controls the movement of the large cursor at the bottom of the CRT screen.

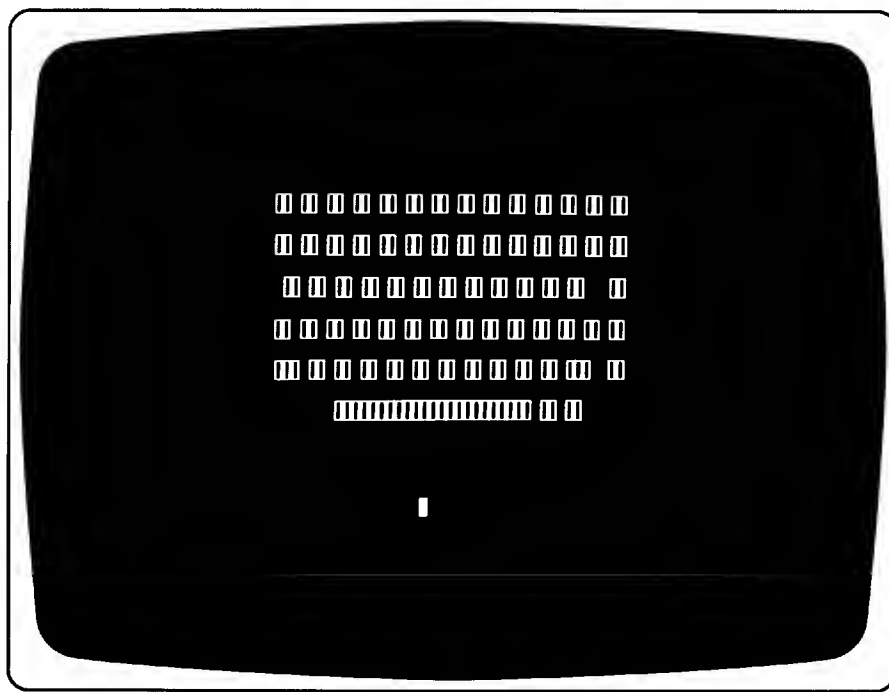


Figure 6-6A. 9816 Keyboard Test CRT Display.

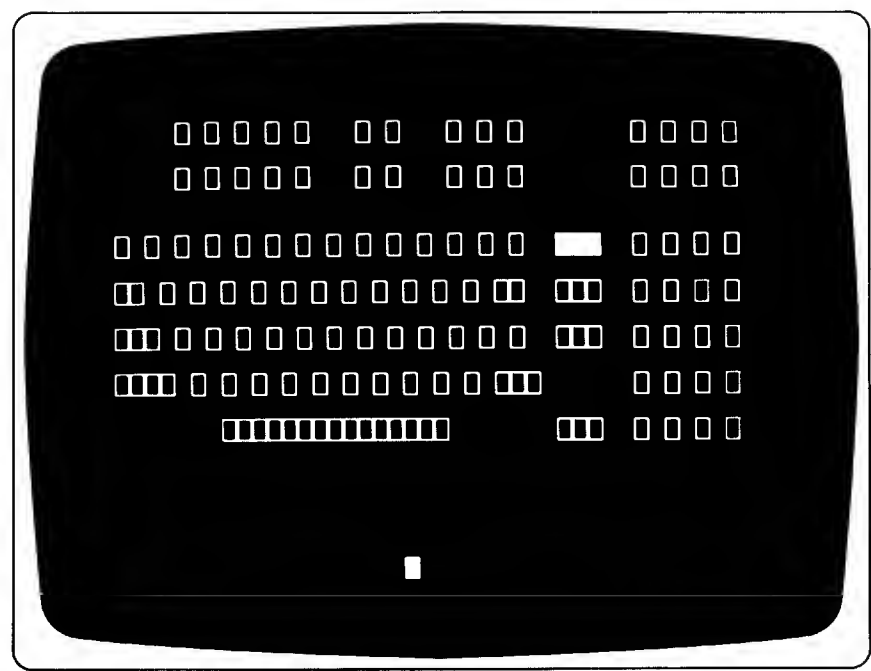


Figure 6-6B. 9826 Keyboard Test CRT Display



Figure 6-6C. 9836 Keyboard Test CRT Display.

The keyboard test does not test the beeper. It can be checked by entering test mode and pressing character keys. Each key will produce a different pitch.

If the keyboard test fails, any of these messages may appear on the CRT:

LVL 1 INT XX YY ZZ*

KBD FAILED SLFTST

KBD STS XX NOT 71

KBD DATA XX NOT 8E

KBD NOT RDY,XXXXXX

KBD NOT INT W/DATA

KBD INT NO CAUSE XX

KBD INT STATUS XX

KBD INT MASK

KBD TIMER SLOW OR
NO INT YY (ZZ,WW)

KBD TIMER FAST YY (ZZ,WW)

NO KBD NMI

KBD REAL TIME CLK BAD,
XXXXDAYS, YYYYYYms

KBD KEY CODE YY, STATUS
ZZ

LVL 2 INT IN k#

* See Level One Interrupt note.

If a language or system jumper is installed in the keyboard, one of these messages should occur:

| | | |
|---------------|---|---------------------|
| LANG JMPR = X | 1 | French |
| | 2 | German |
| | 3 | Swedish/Finnish |
| | 4 | Spanish |
| | 5 | Japanese (Katakana) |
| | 6 | System jumper 9 |
| | 7 | System jumper 10 |
| | 8 | System jumper 11 |
| SYS JMPR = X | 1 | System jumper 1 |
| | 2 | System jumper 2 |
| | 3 | System jumper 3 |
| | 4 | System jumper 4 |
| | 5 | System jumper 5 |
| | 6 | System jumper 6 |
| | 7 | System jumper 7 |
| | 8 | System jumper 8 |

The keyboard test can be terminated in any one of several ways. If no keys are pressed, the test terminates in five seconds. If one or more keys are pressed, the test terminates one minute after the last key is pressed. Pressing CONTROL k0 terminates the test immediately.

Level One Interrupts

The keyboard test reports keystrokes and rotary control knob movements made during other tests that are not required by the other tests. These are reported as level one interrupts, with the error message

LEVEL 1 INT XX YY ZZ

This error message can also indicate a problem. To tell the difference, look at ZZ. If ZZ is 10, there is a problem, probably in the motherboard, keyboard or an interface card. If ZZ is 20, look at the first X. If it is 7 or less, a timer problem is indicated, probably with the motherboard. Other numbers indicate keystrokes or rotary control knob movements, according to this chart:

| First X | Cause |
|---------|-----------------------------|
| 8 | Shift, control, key pressed |
| 9 | Control, key pressed |
| A | Shift, key pressed |
| B | Key pressed |
| F | Rotary control knob moved |

Disc Drive Test (k5)

The disc drive test is included in the system test procedure. It checks several functions of the disc drive. Some of the checks can be made with no disc in the drive, some require a disc, and some require a special disc to be installed.

The disc drive test begins with a check of the 256 bytes of memory located in the drive controller. The drive motor is turned on and then turned off. The track 0 switch, track, data and sector registers are checked. If a disc is installed in the drive, the time between index pulses is measured and head selection, read address, CRC and margin error are checked. If the disc is initialized and write-enabled, and contains the proper ASCII file called TROMDATA, test patterns are written, then read and checked for accuracy.

The right-hand drive is designated drive 0 and the left-hand drive (if a 9836) is drive 1.

If the disc drive test fails, any of the following messages appear on the CRT:

```
RAM @ 44EXXX had
000000YY not
000000ZZ
```

```
DRV D FAST YYYY
(ZZZZ,WWWW)
```

```
DRV D SLOW YYYY
(ZZZZ,WWWW)
```

```
DRV D TRK REG had XX
not YY
```

```
DRV D SEC REG had XX
not YY
```

```
DRV D DAT REG had XX
not YY
```

```
DRV D CLR EXSTS
FAILED
```

```
RAM HOLD @ 44EXXX had
YY not ZZ
```

```
RAM SPEED YYYY @ 44EXXXX
(ZZZZ,WWWW)
```

```
DRV D DISC STS XX CMD
XX XCMD XX TRXX SECXX*
```

* Due to disc controller access timing differences between this test routine and the operating system, one disc status error per hour is acceptable.

DRV D NO INT AFTER RES

DRV D LVL 2 INT

DRV D DISC WRT YYYYYYYY
RD ZZZZZZZZ

DRV D TRK REG had XX
not YY AFTER ZZ STS WW

DRV D NO TR00 AFTER XX

DRV D TR00 TRUE AFTER XX

DRV D BUSY XXXXXX

DRV D TIMEOUT XXXXXX

DRV D MOTOR OFF & RDY

DRV D NO INDEX

DRV D DISC FDC

DRV D MARGIN

DRV D READ ADD XXXXXX

DRV D CRC

DRV D WRT PROCT

DRV D NO DISC OR
NOT RDY

DRV D NO FILE OR NOT
ASCII

DRV D FILE SMALL

All errors except DRV D NO DISC OR NOT RDY, DRV D NO FILE OR NOT ASCII, DRV D FILE SMALL, DRV D MARGIN and DRV D NO INDEX may cause discs to be incorrectly written and thus unusable.

DRV D MARGIN and DRV D NO INDEX can cause read errors or prevent writes from occurring.

Disc Drive Diagnostic (k9)

The mainframe test disc contains an extensive diagnostic of the disc drive. The disc drive diagnostic should be used for in-depth troubleshooting of the drive assembly.

To enter the diagnostic from test mode, press softkeys k9 and k18 (SHIFT k8). Upon entering the test, the drive motor is turned on and a restore command is executed. Then the softkeys are used to perform the following operations:

- k0 Step in with update command.
- k1 Step out with update command.
- k2 Head select toggle.
- k3 Restore command.
- k4 Drive select toggle. In a 9826, this will produce a NO LEFT DRIVE message.
- k5 Read address command, with six bytes returned. Information returned includes: track, head, sector, block length and CRC. It is displayed in the form: READ ADD, TRKXX, HDXX, SECXX, BL01, CRCXXXX.
- k6 Read sector command, causing a prompt requesting the sector number to be displayed (DUMP SEC?). When a sector number (0 to 9 or A to F) is entered, a read sector command is given. This returns 256 bytes of data, which are displayed in hexadecimal. Data which decodes into ASCII is displayed in ASCII on the right side of the CRT.
- k7 Read full track, with the data displayed 256 bytes at a time. The display will advance every four seconds unless the PAUSE key is pressed (causing the display to stop until the CONTINUE key is pressed), or the CONTINUE key is pressed (causing the display to advance quickly).
- k8 Exit to test mode. The motor is turned off and the program returns control to test mode. Softkey k8 is the same as RESET (SHIFT PAUSE).
- k9 Unused.

Extended command refers to instructions sent by the disc drive controller to the disc drive mechanism. Extended status refers to status information sent to the controller by the drive mechanism.

The following messages are displayed on the CRT in conjunction with the softkey operations:

CMD XX, EXCMD YY,
STS ZZ, EXSTS WW

This message displays command and status information about the previous operation. The command was XX, the extended command was YY, the status result was ZZ and the extended status result was WW.

REGs: TRK XX, SEC
YY, DAT ZZ

This message displays register contents information about the previous operation. The contents of the (physical) track register was XX, sector register was YY and data register was ZZ.

READ ADD TRK XX, HD
YY, SEC ZZ, BL WW,
CRC VVVV

This message is displayed when a read address is done during the disc drive diagnostic. The (logical) track is XX, the (logical) head is YY, the sector is ZZ, the block length is WW and the CRC is VVVV.

| | |
|----------------------------|--|
| DUMP SEC? XX | This is a message prompting the operator to enter a number from 0 to F (hex) which selects a sector to be dumped to the CRT. The sector numbered on the track and side selected earlier. |
| DUMP FULL TRACK OF XXXX | This message tells how many bytes were read when the read full track command was executed. |
| STARTS @ XXXX | This message shows where you are in the dump of a read full track. |

xx xx xx xx xx xx xx xx xx xx xx xx yyyyyyyyyyyyyy

This is the format of the read sector and read full track dump. ASCII characters with codes of 00 to 1F are converted into the ASCII character and printed in the "y" section of the dump.

Power-fail Test (k20)

The power-fail test is included in the System Test procedure and is performed when the power-fail option is detected as present. A message is stating that the power-fail option is present is sent to the CRT on the first pass. This test checks the 8041 self-test results, the CMOS RAM and the CMOS counter. The battery, the non-maskable interrupt and the relay are not tested.

If this test fails, any of the following messages may be displayed:

PF IBF/OBF/F1

PF TIMEOUT (a XXXXXX

PF FAILED SLFTST XX

PF RAM DATA was YY not ZZ (a XX

PF CLOCK SLOW YYYY (ZZZZ,WWWW)

PF CLOCK FAST YYYY (ZZZZ,WWWW)

Refer the computer to service if you obtain any of these error messages.

I/O Configuration Test (k26)

The I/O Configuration test is included in the System Test Procedure. It begins by checking the internal HP-IB to see if it is the system controller. Then it checks for the presence of a DMA card and the other interfaces. It displays a map of the I/O on the first pass.

There are no error messages associated with the I/O Configuration test.

Serial Interface Test (k28)

The Serial Interface test is included in the System Test Procedure. It checks all the serial (RS-232) interfaces in the computer, both built-in (such as the 9816) and add-on.

This test checks the modem lines, status change interrupts and serial data. If the test connector (part number 98626-67950) is installed, outbound signals are looped back to the appropriate input lines. If not, the loop capability of the serial interface is selected. Serial data is sent and received at several baud rates between 50 and 38.4k baud.

If the serial interface test fails, any of these error messages may be displayed:

NO RS-232 IN 9816

RS-232 Sc X, RESET FAILED (RY,ZZ)

RS-232 Sc X, OUT RY,ZZ; IN RW = UU not VV

UNEXPECTED INT ON LVL X

INT NO CAUSE XX

RS-232 Sc X, RATE YYYY SLOW

RS-232 Sc X, SENT YY RCVD ZZ, REG23 WW, RATE VVVV

RS-232 Sc X, TIMEOUT YYYYYY

RS-232 Sc X, NO INT

Refer the computer to service if you obtain any of these error messages.

Other Error Messages

There are several error messages which may be displayed that are not associated with any particular test. Here is a list of them:

BUS ERR @ XXXXXX IN KT

+ + + EXCEPTION @ XXXXXX IN KT

NO RAM AT FF

UNEXPECTED LVL # INT W/SR = 2700

NO INTERRUPT ON LVL #

GOT INT LVL X EXPECTED Y

SR was #Y## not #Z## AFTER INT

SR was #Y## not #Z## AFTER INT ON STACK

INT RTE ADDR was XXXXXX not YYYYYY

STACK POINTER was XXXXXX not YYYYYY

Refer the computer to service if you obtain any of these error messages.

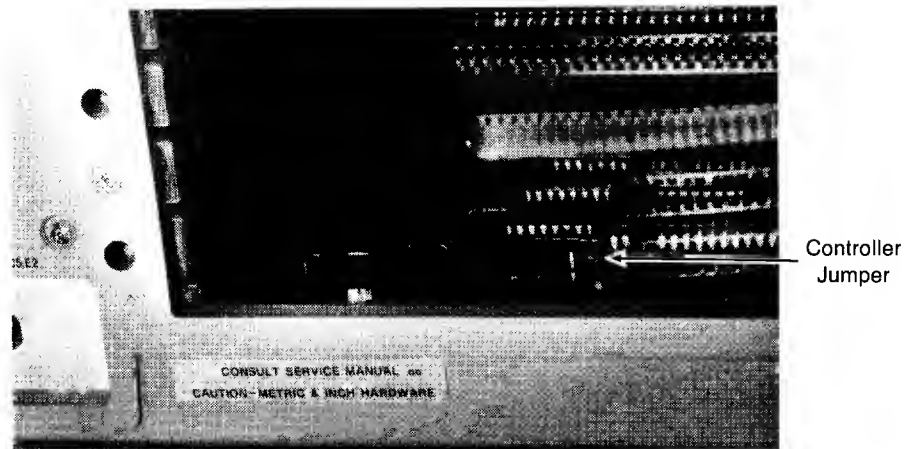
Appendix A

Internal HP-IB System Controller Settings

Setting the Model 26/36

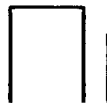
To change the internal HP-IB system controller setting, you must move the system controller jumper to its alternate position.

The system controller jumper is a small plastic tab located near the center of your computer's motherboard (see the following photo).

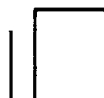


The motherboard is located below the interface and memory board slots, so you may have to remove the bottom-most cards to access the jumper.

To set the internal HP-IB to non-system controller, pull the jumper straight up so that it slips off the two wire posts that support it. Replace the jumper so that it covers the two **left-most** wire posts, leaving the right-most post exposed (see the following diagram).

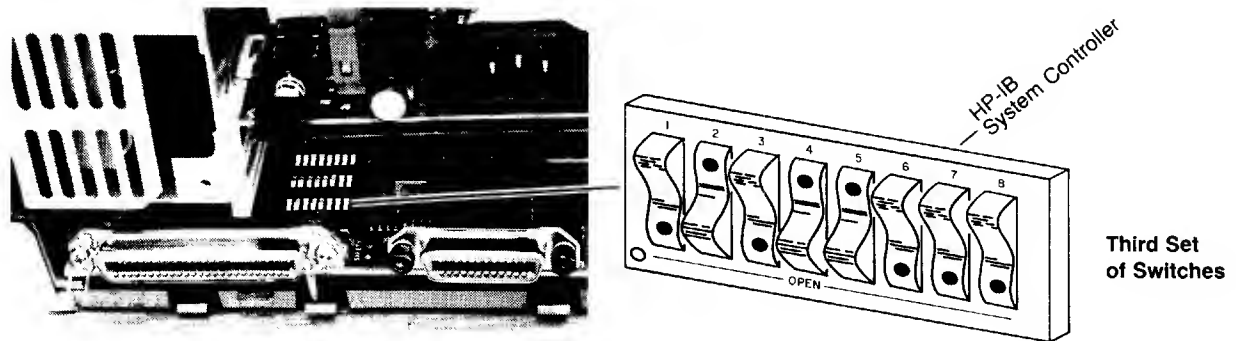


To set the internal HP-IB to system controller, pull the jumper straight up so that it slips off the two wire posts that support it. Replace the jumper so that it covers the two **right-most** wire posts, leaving the left-most post exposed (see the following diagram).



Setting the Model 16

The Model 16 has a dip switch on its processor board that is used set the system controller (see the following photo).



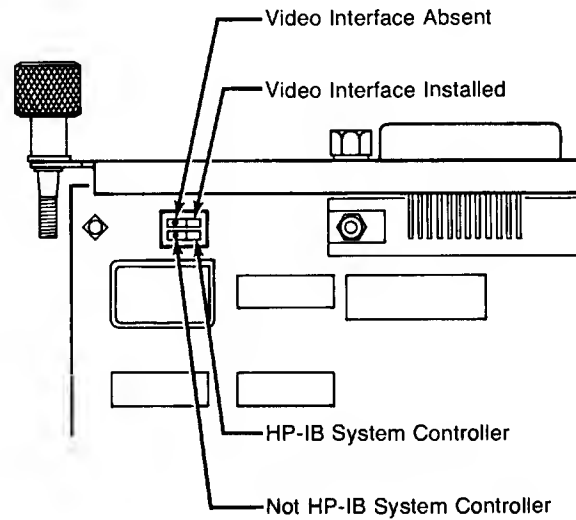
Default Switch Positions on the Process Board

To change the computer to HP-IB system controller, set switch 7 to its OPEN (1) position.

To change the computer to non-system controller, set switch 7 to its alternate position (not OPEN).

Setting the Model 20

The Model 20 has a dip switch on its HP-IB/Keyboard interface card that is used to set the system controller. The switch is marked “SYS” on the card.



To change the computer to system controller, set the switch to its “1” position.

To change the computer to non-system controller, set the switch to its “0” position.

A-4 Internal HP-IB System Controller Settings

